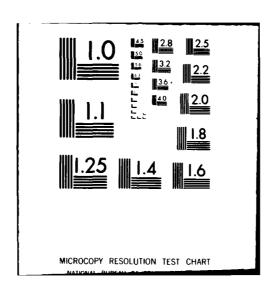
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THESIS

An Accuracy Analysis of The Army Materiel System Analysis Activity Reliability Growth Model

by

Donald Paul Amiotte

June 1980

Thesis Advisor:

W. M. Woods

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RECIPIENT'S CATALOG NUMBER REPORT DOCUMENTATION PAGE 2. SOUT ACCESSION NO. Master's Thesis An Accuracy Analysis of The Army June 1980 Materiel System Analysis Activity Reliability Growth Model PERFORMING ORG. REPORT NUMBER CONTRACT OR GRANT NUMBER(s) Donald Paul /Amiotte PERFORMING ORGANIZATION NAME AND ADDRESS PROGRAM ÉLEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS Naval Postgraduate School Monterey, California 93940 11 CONTROLLING OFFICE NAME AND ADDRESS 12. REPORT DATE_ Jun 80 Naval Postgraduate School 15. NUMBER OF PAGES Monterey, California 93940 TA. MONITORING AGENCY NAME & ADDRESS(II different from Controlling Office) 18. SECURITY CLASS. (of Mis report) UNCLASSIFIED 18a. DECLASSIFICATION/DOWNGRADING 16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited 17. DISTRIBUTION STATEMENT (of the cherrost entered in Block 20, if different from Report) IS. SUPPLEMENTARY NOTES 19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Reliability Growth, Statistical Model, Analysis, Failure Rate Estimates, Performance Plots, Modifications 28. ABSTRACT (Continue on reverse side if necessary and identify by block manher)

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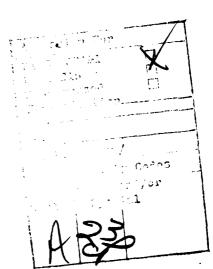
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An Accuracy Analysis of The Army Materiel System Analysis Activity Reliability Growth Model

bу

Donald Paul Amiotte Captain, United States Marine Corps B.S., University of Kansas, 1971

Submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN OPERATIONS RESEARCH

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ABSTRACT

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I. INTRODUCTION

Many methods of modeling reliability growth have been proposed and used with some success. Reference 1 contains a detailed discussion of reliability growth, reliability growth models, and describes several models that are available to the manager for use in measuring reliability growth in his program.

The purpose of this study is to evaluate the accuracy of the Army Materiel Systems Analysis Activity (AMSAA) reliability growth model [Ref. 1] for systems which provide limited test data during the development cycle.

II. THE AMSAA RELIABILITY GROWTH MODEL

The AMSAA reliability growth model is a statistical model that estimates reliability growth trends. It is applicable to systems for which usage data is measured on a continuous scale.

As with most reliability growth models, the AMSAA model uses test data to estimate unknown parameters which are then used to estimate the reliability growth trend.

References 1 and 2 develop the AMSAA model in detail. This paper addresses the use of the AMSAA model for sequential, time-terminated testing.

Time-terminated testing occurs when each item is tested until failure or until that item has been tested a specified amount of time. If an item does not fail before the planned test time, then a failure has not occurred and the next item is tested.

For time-terminated testing, the AMSAA model [Ref. 1] provides the following estimate for the failure rate of a type of hardware unit (component, assembly, subsystem, system) at total accumulated test time T on that type of unit;

$$\hat{\mathbf{r}} = \hat{\beta} \left(\frac{\mathbf{N}}{T} \right) ,$$

where N = number of failures of that type of item to
 time T

and

$$\hat{\beta} = \frac{N}{N \ln T - \sum_{j=1}^{N} \ln X_{j}}$$

with X_j = total accumulated test time over all items tested when the j th failure occurs.

Using these estimators, the accuracy of the AMSAA model was evaluated for a variety of reliability growth patterns.

III. TESTING PROCEDURE

Reliability growth models are often evaluated against actual test data. The problem with evaluating a model against actual data is that the failure rate driving the system at any one time is never known, it can only be estimated.

The purpose of this chapter is to describe the test plan under which the analysis was made and define the test organization used. Figure 1 shows the relationship between the elements of the test plan and the organization of the testing.

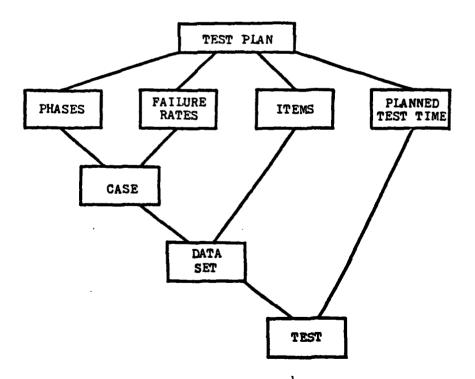


Figure 1. Test Organization

A. TEST PLAN

The key elements of the test plan used for the evaluation of the AMSAA model are described below.

1. Phases

Tests were conducted in phases consisting of testing a specified number of items with randomly generated exponential failure times based on the failure rate specified for that phase.

2. Failure Rates

Each phase had a specified failure rate, which was assumed to be constant for the duration of the phase. The failure rates specified could be different from phase to phase. This set of failure rates defined the reliability growth pattern for a test.

3. Items Tested

A specified number of items was tested in each phase. In this analysis, the number of items tested was the same for each phase in any one test.

4. Planned Test Time

Each item in a phase was tested to failure or until the specified planned test time for that phase was reached. The planned test time was the same for all items tested during any one phase.

B. TEST ORGANIZATION

1. Cases

The AMSAA model was applied to 18 test cases where each case was defined by a set of failure rates and a

specified number of phases. The general shape of the various cases, classified by number of phases and by trend of growth, can be found in Figures 2 through 5. Test phases are plotted, equally spaced, on the horizontal axis and failure rates are plotted on the vertical axis.

a. Set of Failure Rates

Each set of failure rates defined a reliability growth curve which was then classified by its general trend of growth into one of two categories:

- (1) Non-increasing Failure Rates (Figures 2 and 3)
- (2) Failure Rates that Increase
 at least once during testing
 (Figures 4 and 5)

b. Number of Phases

In addition to their growth trend, cases were grouped, for comparison, by their total number of phases.

The two groups are those that have 16 phases and those that have 6 phases.

- (1) <u>16-Phase Cases</u>. Cases 1 through 6
 (Figure 2) and cases 13 through 18 (Figure 5) were each defined by specifying 16 failure rates, one for each of the 16 test phases.
- (2) 6-Phase Cases. The growth patterns for cases 7 through 12 (Figures 3 and 4) were defined by a set of six failure rates. Some of the cases reflect the same growth patterns shown for the 16-Phase cases, except that, the testing was carried out for only six test phases:

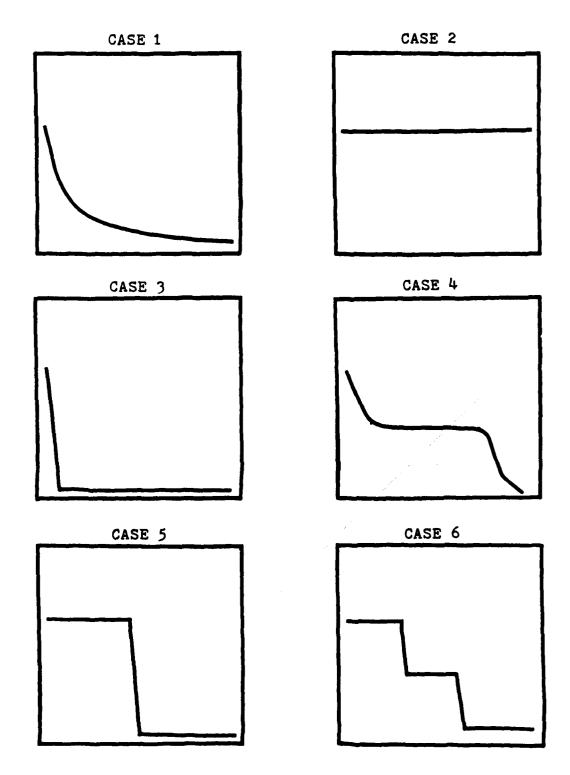


Figure 2. 16-Phase Cases with Non-increasing Failure Rates

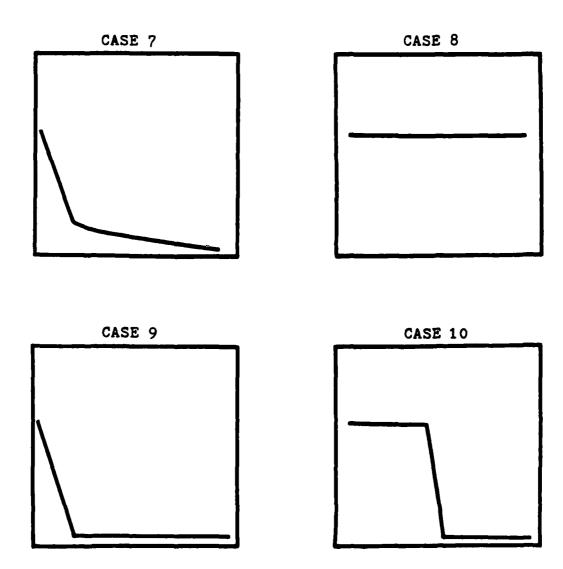
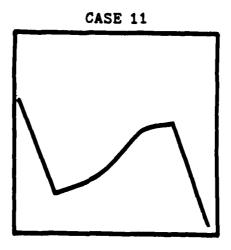


Figure 3. 6-Phase Cases with Non-increasing Failure Rates



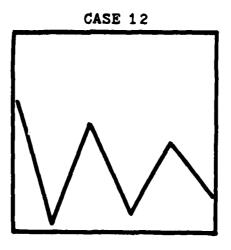


Figure 4. 6-Phase Cases with Failure Rates that Increase

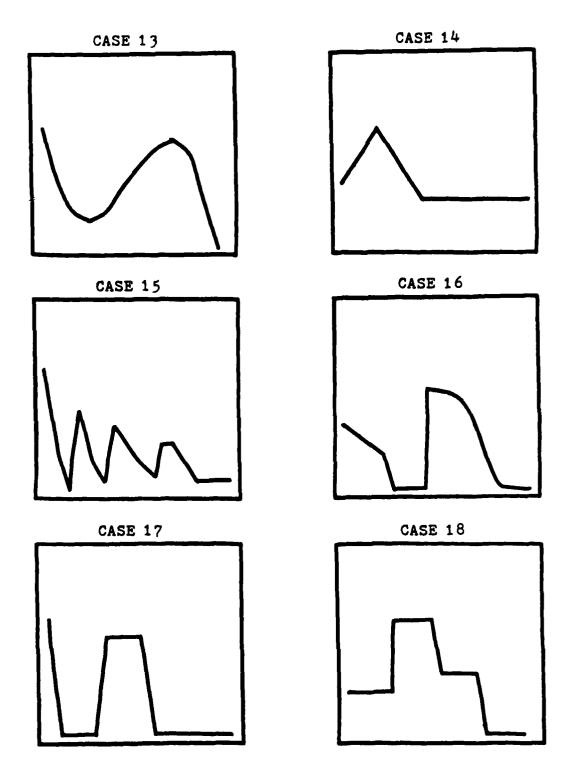


Figure 5. 16-Phase Cases with Failure Rates that Increase

2. Data Sets

Specification of the number of items to be tested in any phase for a particular case resulted in a Data Set. The number of items tested during a phase was the same for each phase of testing. Three sets of test data were generated for each case, one set each for tests with 5, 10, and 20 items per phase.

3. Tests

The remaining element of the test plan, Planned Test Time, was used to define individual tests. Since the failure rate underlying the exponential test times was known, planned test times were chosen so that the probability of survival was such that sufficient failures would occur.

a. Test 1

The planned test times for Test 1 were generated so that the probability of survival for each item would be .85.

b. Test 2

Test 2 consisted of generating planned test times by using a probability of survival for each item of .99.

This test was run to see how the model performed with very limited data.

IV. ANALYSIS PROCEDURE

A. MODEL ESTIMATES

1. Shape Parameter

Using the test data generated above, the shape parameter for the model was estimated at the end of each phase, i, using the AMSAA estimator:

$$\hat{\beta}_{i} = \frac{N_{i}}{N_{i} \ln T_{i} - \sum_{j=i}^{\Sigma} \ln X_{j}},$$

where

N_i = number of failures that occurred to the
 end of phase i,

T = total accumulated test time over all
 items to the end of phase i,

and X_j = total accumulated test time over all items when the j th failure occurs with a small exception. 1

2. Failure Rate

The model estimate of the failure rate at the end of the i th phase was computed in accordance with the AMSAA model as follows:

¹ It should be noted that the estimate of β can only be computed when $N_i \ge 1$. If $N_i = 1$, the failure must not occur as the last item of a phase since, in that case, $T_i = X_i$, thus making $\hat{\beta}$ an indeterminate form.

$$\hat{\mathbf{r}}_{\mathbf{i}} = \hat{\boldsymbol{\beta}}_{\mathbf{i}} \left(\frac{\mathbf{N}_{\mathbf{i}}}{\mathbf{T}_{\mathbf{i}}} \right).$$

This resulted in a set of failure rate estimates that was then compared to the set of specified failure rates used to generate the test data.

B. EVALUATION CRITERIA

The manager using a reliability growth model is interested in two things, accuracy and variability.

1. Accuracy

Accuracy measures the ability of the model to track a reliability growth trend. The measure of accuracy used in evaluating the AMSAA model was the failure rate estimate error as a percentage of the actual failure rate.

This percentage error is defined as follows:

$$e_{i} = \frac{|\vec{r}_{i} - r_{i}|}{r_{i}} \times 100$$
,

where $r_i^{=}$ = mean estimate of the failure rate for the i th phase²

and r. = specified failure rate for the i the phase.

This measure of error was calculated at the end of each phase and used to trace the accuracy of the model over

² Sample may be less than the 100 replications simulated. See footnote 1, page 17.

all phases of each test case. This estimate error, as a percentage of the actual failure rate, can be found in the tabulated statistics for each Data Set of the tests contained in the appendices.

2. Variability

A manager, considering a reliability growth model for use in a program, will not only be concerned with the model's accuracy, but will be concerned with the variability of the estimates the model provides.

The simulation used for this evaluation was replicated 100 times. The mean estimates used to evaluate the tracking and measure the accuracy of the model only have value over the long run. A manager, however, is primarily interested in the one real application of the model. He is concerned with how well a model performs for a single replication and is thus ultimately concerned about the variability of the estimates he gets from the model in addition to its tracking accuracy.

The measure of variability used for this study was the standard deviation about the mean estimate of the failure rate, r_i ,

S.D.
$$(\hat{r}_i) = \sqrt{\frac{1}{K} \sum (\hat{r}_i - \hat{r}_i)^2}$$
,

where K = number of replications that yielded estimates.

As with the failure rate percent error, the standard deviation of the failure rate estimate is contained in the tabulated statistics for each data set.

V. RESULTS

A. GENERAL DESCRIPTION

The results of the analysis are presented in the following manner. The output for each test is contained in a separate appendix to this paper. A data set is identified at the top of each page. This heading consists of the case number and the number of items for the data set. The output for each data set consists of two parts; the tabulated statistics and a performance plot. Figure 6 is a sample of the presentation of the results of a typical data set.

1. Tabulated Statistics

The input parameters, model estimates, measures of performance, and system status at the end of each phase of testing are tabulated for each data set. The values given are the average values over all replications for the data set. Figure 6 shows the format of the tabulated results. The following paragraphs describe each line of the format.

a. Input Parameters

(1) PHASE. This line indicates the phase of testing for the results listed below. Throughout the appendices, results for 6- and 16-phase growth patterns are presented. For 16-phase cases, the first 8 phases are tabulated above a row of asterisks. The same format is then repeated below the asterisks for phases 9 through 16.

CASE 1 10 STEMS

PEASE	1	2	3	4	5	4	7	6
ACTUAL PAILURE RATE	G.7620	0.4343	0,3200	(.2550	C.2130	0.1633	C.1015	0.1446
FLARREC TEST TIPE	0.2315	0.3745	3.5079	C-6373	C.763C	0.88.1	1.00%	1.1266
MCSEL ESTEMATE	5.4Ai8	0.6276	0.4502	(.3208	C.254L	G.23G8	C-1447	4.1691
BETTURYE ERROR AS BETTER OF ACTUAL BALLUPE RATE	602.03	46.51	+0-70	28.14	21-16	26.14	21.53	10.74
SAPPLE STO DESIGNATION	23.0502	0-4566	0.3609	C.1996	C.1228	Ç.1143	0.6463	7.065
CUPULATINE TEST FIRE	2.144	5.623	13.309	14.239	23.271	31.330	46.415	51.176
CLPLEATIVE FAILUAGE	1.3300	2.8500	5300	1.5300	1.4700	5.1500	10.0256	12.0100

P+=5E	· 9	15	11	12	t3	14	15	16
ACTUAL PAILLAS MATE	0-7320	0.1160	0,1090	C.1010	C.C936	0.0676	0.0623	C.C776
PLAPAGE TEST TIME	1.2219	1.3773	1.4913	1.6391	1.73e3	1.6952	1.6747	2.0543
PCCEL ESTIPATE	C.1523	J.1205	0.1246	C-1;27	C.1055	0.6577	0.0012	C.Case
PATRICULE SATE	14.48	17.34	14.29	11.01	12.76	11.58	10.45	10.54
SAPPLE STE DEVIATION	0.0534	0.0447	0.03e7	0.0332	6.6524	Q.CZES	0.0219	0.0201
CLPLLATINE TEST TIPE	62.421	75.054	88-887	103.821	115.602	136-857	151.152	174-540
Cupulative pailure:	13.5200	15.G4CC	16.4500	17.7900	15.3500	20.6200	22.3260	23.8000

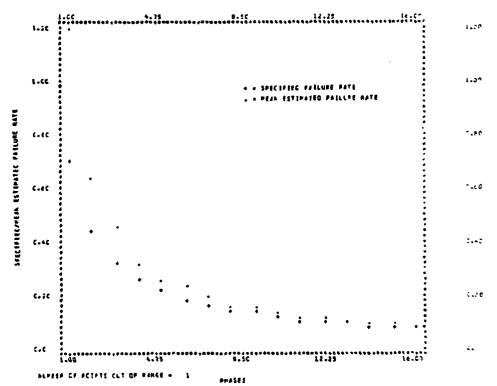


Figure 6. Format for Results of a Data Set

- (2) ACTUAL FAILURE RATE. This row consists of the sequence of specified failure rates that defines the reliability growth curve for the test case given in the heading. In Figure 6, the specified failure rates for Phases 8 and 9 are 0.1440 and 0.1330 respectively.
- which each item was tested if it did not fail, is given.

 This number was based on the actual failure rate and the specified probability of survival for the test. This test time was the same for all items tested in a phase. For example, 10 items were tested in each of the 16 phases shown in Figure 6. Those items tested in Phase 8 were tested for 1.1286 time units or until failure.

b. Model Estimates

(1) MODEL ESTIMATE. Line 4 of Figure 6 contains the estimates of the failure rate provided by the AMSAA model (see Section IV-A) for each phase of testing. Referring to Figure 6, it can be seen that the model estimate of the failure rate at the end of the 8th Phase of testing was 0.1681 as compared to the actual failure rate of 0.1440.

c. Measures of Performance

(1) ESTIMATE ERROR. Here, the estimate error as a percentage of the actual failure rate, is given. Again, looking at the results for Phase 8, the percent error of 16.75 is found. This was computed as follows:

$$\frac{0.1681 - 0.1440}{0.1440} \times 100 = 16.74$$

The difference in the two percent errors is due to the extra accuracy carried by the computer.

(2) <u>SAMPLE STD DEVIATION</u>. The next line of entries is the standard deviation of the model estimate. This criteria is discussed in Section IV-B. The standard deviation of the model estimate for Phase 8 is 0.0685.

d. System Status

- (1) <u>CUMULATIVE TEST TIME</u>. This row contains the total test time over all items as of the end of the indicated phase. At the end of the 8th Phase of testing, 51.176 time units of testing had been performed on the system.
- (2) <u>CUMULATIVE FAILURES</u>. The final entry in the table is that of total failures on the system to the end of the phase. As illustrated by Figure 6, an average of 12.01 failures occurred over all replications. This means that, of the 80 items tested to the end of the 8th Phase, 12 failed.

2. Performance Plot

As an aid to evaluating the tracking accuracy of the model, the specified failure rate and the estimated failure rate are plotted for each phase of a test. Figure 6 contains an example of a typical plot.

All failure rates are plotted on a scale of 0 to 1.2. If an estimate is greater than 1.2, it is plotted at 1.2 and is noted as a point "out of range". More precise values of the points plotted can be obtained from the tabulated output above the plot.

The phases, for each failure rate plotted, are scaled on the horizontal axis. By referring to the CUMULA-TIVE TEST TIME row of the tabulated statistics above the plot, the amount of test time on the system, to the end of a phase, can be found.

For example, in Figure 6, the items tested had 51.176 time units of testing at the end of Phase 8 and 62.421 time units at the end of Phase 9. Thus test Phase 9 consisted of 11.245 time units of testing.

B. TEST 1

The results for Test 1 are given in Appendix A. Model estimates, made when cumulative test times on the system were less than 10 hours, had a high percentage error and large standard deviations. Testing more items per phase tended to provide better estimates earlier in the testing.

1. Non-increasing Failure Rates

As would be expected, the AMSAA model tracks growth patterns that approximate continuously decreasing curves (Case 1) better than those that have drastic step changes (Case 6). The model had a tendency to provide estimates which lag behind the actual value of the failure rate.

This is reflected in the increase in percentage error during the latter phases of testing. As can be seen in Case 4, several phases of constant failure rate will cause the model to lag behind even moderate changes in the failure rate.

2. Failure Rates that Increase

As can be seen in the performance plots of Cases 11 through 18, the AMSAA model has a tendency to smooth oscillations in the failure rate. This also seems to be due to the tendency of the model to provide estimates of the failure rate that lag the actual failure rate when the growth pattern makes large step changes. This characteristic can cause some large percentage errors and standard deviations in the later phases of testing when the failure rate increases for any reason.

C. TEST 2

Test 2 used planned test times generated for a probability of survival of .99. This resulted in far fewer failures during the testing which severely curtailed the model's ability to track a reliability growth pattern.

Appendix B contains the results for some representative cases. As in Test 1, a minimum number of test hours or failures is required for the model to make an accurate estimate. This requirement is not met when a high reliability system is being tested.

The results in Appendix B show a high percent error and a large standard deviation for the estimates made during the test.

D. MODIFICATIONS

As discussed above, the percentage error and the sample standard deviation of the model estimates were high during the early phases of testing and when failure rates increased. In an attempt to reduce this error, the AMSAA model was used in four modified test situations. All four tests used the point estimate of the failure rate

It should be noted that the number of failures and the test time used to compute the point estimate are not accumulated over all phases but are only for the current phase of testing.

The point estimate, r_p , was used for any phase where the cumulative test time on the system was less than 10 hours. Once the 10 hour threshold was exceeded, AMSAA model estimates were used. These estimates were made using all data from the beginning of testing if the failure rate was not considered to have increased. The four modified tests differed only in their handling of increasing failure rates.

1. Estimating Slope

In order to determine whether the trend of failure rates was increasing, the slope of the trend was estimated. Two methods were used:

a. 2-Point Estimate of Slope

The slope was estimated using the point estimate, r_p , for the current phase and the last estimate, r_{i-1} , which may have been from the model or a point estimate.

Thus SLOPE =
$$r_p - \hat{r}_{i-1}$$
.

b. 3-Point Estimate of Slope

This method of estimating slope was used to reduce the change that the estimated slope would be affected by a randomly high point estimate. The slope was estimated using the point estimate, r_p , for the current phase and the last two estimates \hat{r}_{i-1} and \hat{r}_{i-2} . The slope estimated consisted of two parts:

$$\hat{r}_{i-1} - \hat{r}_{i-2}$$
 and $r_p - \hat{r}_{i-1}$.

For the estimate of the slope to be considered increasing, both parts had to be determined to be increasing.

2. Determining Increasing Slope

2

Two methods of determining when an estimate of slope could be considered increasing were used. The estimates of slope described above were tested in one of the

following ways for each of the modified tests.

SLOPE
$$\geq .2\hat{r}_{i-1}$$

3. Modified Tests

Figure 7 shows the composition of each of the four modified tests.

•	SLOPE ≥ .07	SLOPE ≥ .2r _{i-1}
2-Point Slope Estimate	$\frac{\text{MOD1}}{r_p - r_{i-1} \ge .07}$	$r_{p} - r_{i-1} \ge .2r_{i-1}$
3-Point Slope Estimate	$r_{i-1} - r_{i-2} \ge .07$ and $r_{p} - r_{i-1} \ge .07$	$r_{i-1} - r_{i-2} \ge \cdot 2r_{i-2}$ and $r_{p} - r_{i-1} \ge \cdot 2r_{i-1}$

Figure 7. Composition of the Modified Tests

The results of the modified tests are presented in the appendices as follows:

TEST	APPENDIX
MOD1	С
MOD2	D
MOD3	E
MOD4	F

Cases 4, 13, 15, and 18 are presented for each test.

APPENDIX A

Results of Test 1

The results of Test 1 for Cases 1 through 18 are contained in this appendix. Each case consists of three data sets, one each for 5, 10, and 20 items. The results are presented in two parts; the tabulated statistics and a performance plot. The elements of the tabulated statistics are described below. For 16-phase cases, the first eight phases are presented above the asterisks and the last eight are shown below.

1. Input Parameters

a. PHASE

This line indicates the phase of testing for which the elements listed below apply. All statistics are as of the end of the indicated phase.

b. ACTUAL FAILURE RATE

This line contains the failure rate specified for the indicated phase. This failure rate was used to generate the exponential failure times used as data for the model.

c. PLANNED TEST TIME

This is the test time to which each item was tested if failure did not occur earlier. For Test 1, the planned test times were generated so that the probability of survival was .85.

2. Model Estimates

a. MODEL ESTIMATE

This is the estimate of the failure rate provided by the model for the test phase indicated (See Section IV-A).

3. Measures of Performance

a. ESTIMATE ERROR AS PERCENTAGE OF ACTUAL FAILURE RATE

These entries were computed as a measure of accuracy to be used for evaluating the tracking accuracy of the AMSAA model (See Section VI-B).

b. SAMPLE STD DEVIATION

These values were computed as a measure of variability for the estimate error (See Section IV-B).

4. System Status

a. CUMULATIVE TEST TIME

The times listed are the total test time accumulated over all phases of testing to the end of the indicated phase.

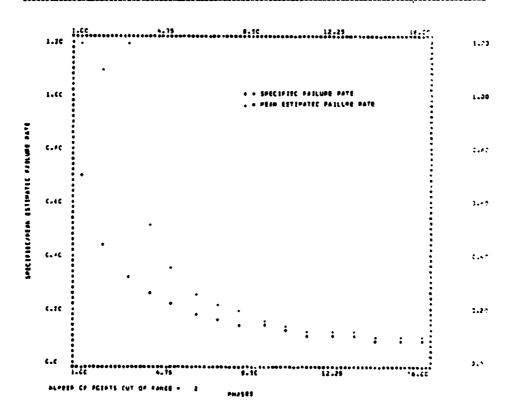
b. CUMULATIVE FAILURES

These entries are the total failuares over all items tested for all phases through the indicated phase.

CASE 1

PHASE	l.	2	3	•	5	•	7	9
ACTUAL PATLLRE RATE	C.7620	0.4343	0.3200	C.2550	C.2130	C.163C	0.1410	0.1440
PLANNEC TEST TIME	9-2315	0.3745	0.5079	G.6373	C.763C	C.8681	Laches	1-1264
*COBL ESTE*ATE	2.3197	1.1099	1.7535	C.5154	0.3615	0.2551	0.2240	7.1435
PRICE TACE OF ACTUAL PAILURE RATE	230.44	155.73	447.58	102.12	45.72	39.42	24.14	34.35
SAMPLE STE CENTATION	2-1070	1.2748	7-143C	Ç.5357	C.290e	0.1342	9.11.02	2.167*
CLPLLATIVE TEST TIPE	1.041	2.422	5.140	1.033	12.513	15.614	20.248	24.447
CUPULATIVE FAILURES	0.5900	1.3100	2.0500	2.9200	1.1766	4.5000	5.243C	4.5600

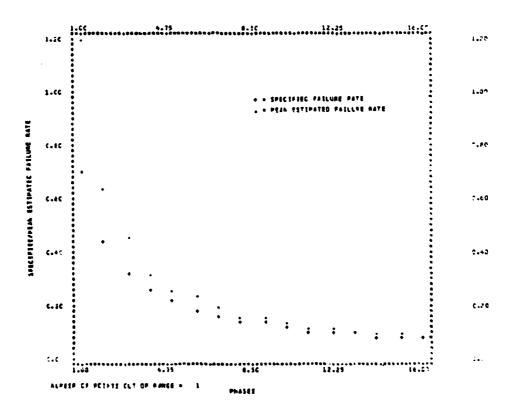
PP158	•	16	11	12	13	14	15	1 e
SCTUSE PABLURE RATE	0.1336	0.1180	0.1393	6.1910	C.5934	2.Ce7e	0.0623	1. (776
PLANNEC TEST TIPE	1.2219	1.3773	1.4910	1.6091	1.7363	1.3552	1.4747	2.0543
PCGEL ESTIMATE	0.1953	0.1393	0.1294	C-1176	C.1112	0.1652	0.0953	0.0506
ESTIMATE EFFCT 45 REACENTESE OF ACTUAL PATILIFE PATE	19.78	17.75	18.7.	16.59	16.43	7:.09	20.4?	17.04
SAMPLE STC GEVIATION	6.3776	0.0728	0.3432	6.3457	0.0521	C. (444	0.0457	7.736
CLPLLATINE TEST TIPE	31.244	37.454	44.478	11.750	99.839	48.251	77.254	84.554
CLPLLATIVE PAILURES	4.5500	7.1960	8.3003	6.7333	1.5166	10.3200	11-12:0	11.200



CASE 1

1	2	3	•	5	4	7	•
6.7020	0.4340	0.3200	C.2550	C.2130	0.1633	C.161C	0.1440
0.2315	0.3745	0.5079	C.4373	C.763G	0.8661	1.6654	1.1266
5.4898	0.6276	0-4502	(.3208	C.2501	C.2308	C.1997	0.1691
482.03	44.51	40-70	28.14	21-16	26.14	21.53	to.75
23.0902	0.4566	C.3609	C.1996	C.1226	C.1143	0.6963	9.0665
2.148	5.623	10.309	16.239	23.271	31.220.	46.475	51-176
1.3300	2.4500	~.53C0	5.6360	7.4700	5.19CC	10.4250	12.0100
	6.7020 0.2313 5.4898 482.03 23.0902	G.7G2G 0.4340 0.2315 0.3745 5.4898 0.6276 482.03 44.51 23.0502 0.4566 2.148 5.623	0.7020 0.4340 0.3200 0.2219 0.3745 0.5079 5.4898 0.4276 0.4502 482.03 44.41 40.70 23.0902 0.4544 0.3009	G.7G2G 0.4340 0.3200 C.2550 0.2315 0.3745 0.5G79 C.4373 5.4898 0.6276 G.4502 C.3208 482.03 44.51 40.70 28.16 23.0902 0.4566 C.3C09 C.1996 2.148 5.623 10.305 16.239	0.7020 0.4340 0.3200 C.2550 C.2130 0.2215 0.3745 0.5079 C.4373 C.7630 5.4898 0.4276 0.4502 C.32+8 C.2581 482.03 44.51 40.70 28.16 21.16 23.0902 0.4546 C.3609 C.1996 C.1228 2.148 5.423 10.305 16.239 23.271	G.7G2G 0.4340 0.320G C.255G C.213G 0.1E30 0.2315 0.3745 0.5079 C.4373 C.763G 0.8681 5.4898 0.4276 0.4502 C.3208 C.2581 G.2308 482.03 44.41 40.70 28.16 21.16 26.14 23.0902 0.4566 G.3C09 C.1996 C.1228 C.1143 2.148 5.623 13.305 16.239 23.271 31.230	0.7020 0.4340 0.3200 C.2550 C.2130 0.1630 C.1610 0.2215 0.3745 0.5079 C.4373 C.7630 0.8881 1.0064 5.4898 0.4276 0.4502 C.3268 C.2581 C.2308 C.1997 482.03 44.61 40.70 28.16 21.16 26.14 21.53 23.0902 0.4546 G.3009 C.1996 C.1228 C.1143 0.0903 2.148 5.623 10.305 16.239 23.271 31.220 40.675

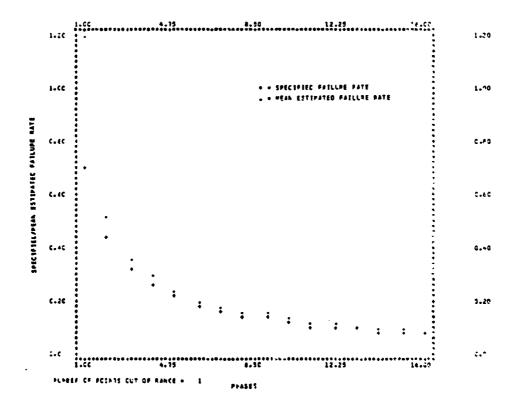
10 12 11 13 14 15 16 ACTUAL FAILURE RATE 0.1330 0.1160 C-1010 C.C936 0.0676 0.0623 C. C776 0.1690 PLANNEC TEST TIME 1.2219 1.3773 1.4913 1.6391 1.7363 1.8552 1.6747 2.0943 PCCEL ESTIMATE C-1523 0.1265 0.1246 C.1:27 C-1055 0.0577 0.0512 C. C85F PRINCIPATE STRUCT AS ACTUAL 14.48 17.34 14.25 11.01 12.74 11.58 10.25 10.54 SAPPLE STC DEVIATION G-0534 0.0447 0.3367 0.0332 C.C258 0.0265 0.0219 0.0207 CUPLLATINE TEST TIPE 42.421 75.C54 88.887 103.621 114.402 134.857 155-152 174-540 CUPLLATIVE PATLURES 13.5220 15.CECC 16.4500 17.7900 15.35CC 2C.8200 22.32C0 22.6000



CASE 1 20 11895

PPASE	1	2	3	•	5	•	7	•
ACTUIL FAILURE RATE	C.7CZC	0.4340	0.3200	C.2550	C.213C	C-1430	0.1610	0.144C
PLANNEC TEST TIPE	0.2215	0.3745	0.5079	0.6373	C.163C	0.284'	1.0054	1.1766
MCCEL ESTIMATE	1.2651	0.5279	0.3457	C.290?	G.2428	C.2C63	C.1835	0.1631
ESTIPATE EFFCR AS PERCENTACE OF ACTUAL PAILUPE PATE	80.22	21.64	14.27	13.62	14.47	12.72	14.21	13.24
SAPPLE STO CEVIATION	2.0237	0-3178	0.1490	0.1098	0.0852	0.0654	0.0591	0.0451
CUPLLATIVE TEST TIPE	4.268	11.149	20.463	32.164	40.215	62.668	#1.2C3	101.570
CLPLLATIVE FAILURES	3.0200	4.0400	9.0+00	11.9900	15.0000	18.0460	21.230C	24.2000

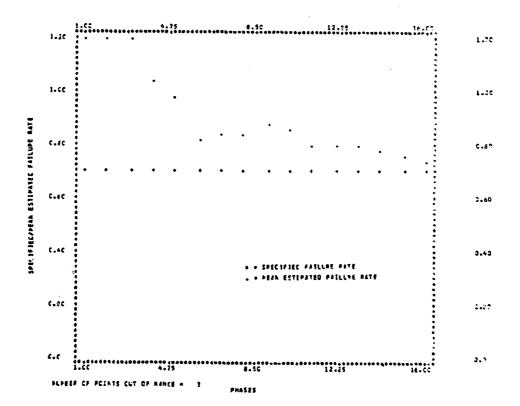
FFASE 10 11 12 13 15 16 SCTUSE FAILLAS RATE C.1333 9.1160 0.1050 C.101C C.C536 r. C77e 3.0876 0.0673 FLANKE TEST TIME 1.2219 1.3773 1.4513 1.4091 1.7343 1.8552 1.5747 2.044 PCCEL ESTIMATE C.1 504 0.1383 0.1228 C.1136 C.1058 0.0943 3.0522 C. Cas 2 ESTIMATE ERACH AS BENEROTAGE OF ACTUAL PARLUSE RATE 13.08 17:17 12.69 12.45 13.05 13.39 11.57 13.04 SAMPLE STO GEVIATION 0.3362 0.0209 0.0253 C.0229 C.C208 0.0186 7.0146 CLECLATINE TEST TIPS 124.427 226.784 309.339 347.506 149.585 177.251 206.590 272.769 CUMULITIVE FAILURES 27.6100 30.8600 33.5300 34.6200 39.700C 42.6700 45.7600



CASE 2 5 il Ebi

PPAEE	1	2	3	•	5	•	7	•
ACTUAL FAILURE RATE	3.7603	0.7000	0.7000	0.7000	C.7000	0.7660	0.7300	0.7000
PLANNEC TEST TIPE	C.2322	0.2222	0.2322	C.2322	0.2322	0.2322	C.2322	0.7327
PCDEL SSTIMATE	2.5820	3.4035	2.0250	1.0789	C.5715	0.2713	0.6775	0.8367
ESTIMATE EPHCR AS PRESENTANTE OF ACTUAL PAILURE RATE	248.86	414.78	189.29	48.41	20.44	17.33	18.42	14.77
SAMPLE STE CENTATION	2-5461	13.3555	6.3476	C-8193	C.8982	0.5571	0.5512	0.4549
CLPLLATIVE TEST TIPE	1.063	2.129	3.198	4.280	9.360	6.437	7,497	#.*ec
CLPLLATINE FAILURES	0.7300	1.5400	2.3400	2.0300	3.740¢	4.3360	5.2200	۰.۲۰۵۲

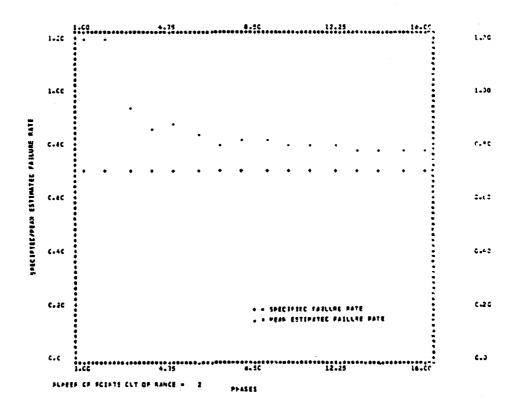
10 11 12 13 STER BRILLE JALTE 5.7603 0.7000 PLANNED TEST TIME Ç.2322 0.2322 C.2322 0.2122 2.2122 3.2322 C.2322 2.2322 PCCEL ESTEMATE 0.8858 0.8688 0.8081 C. 7941 C.7958 0.7798 2.7522 ESTIMATE ERROR AS PERCENTAGE OF ACTUAL PAILURE RATE 26.54 24.12 15.44 13.44 13.68 11.35 7.60 4.63 SAMPLE STO SEVERTION 0.5860 0.4619 0.4465 C.3572 C.3992 3.3149 0.3547 0.2940 5.63C CLHULATIVE TEST TIPE 10. /01 41.781 12.854 12.914 14.585 16.072 CUPLLATIVE FAILURES 6.64GG 7.5eC3 8.2100 E.9500 5.79pc 10.5503 11.2100 11.8400



CASE 2 10 iTCHS

PASE	1	3	3	•	5	•	7	
ACTUAL FAILURE RATE	C.7CO3	0.7000	9.7000	£.7388	C.7300	0.1000	C. 7990	6.7555
PLANNEE TEST TIME	0.2322	0.2222	0.2322	C.2322	C-2322	0.2322	0.2322	2, 2122
PCCEL ESTEMATE	2.0018	1.3248	C.9434	C.4583	C.874C	0.6474	0.6313	7.8142
ESTIMITE ERROR AS PENCEPTAGE OF ACTUAL PAILURE RATE	145.57	89.24	34.77	22.49	25.14	21.56	14.44	16.38
SEPPLE STO CEVIATION	2.6263	1.1457	0.7177	0.5045	C.4714	0.2547	0.3234	C.3168
CLMLLATIVE TEST TIPE	2.155	4.285	4.451	8.597	10.720	12.677	15.018	17.148
CLPLLATIVE FAILURES	1.3 cC C	3.0400	4.3700	5.6900	7.580C	9.0700	10.5600	12.2657

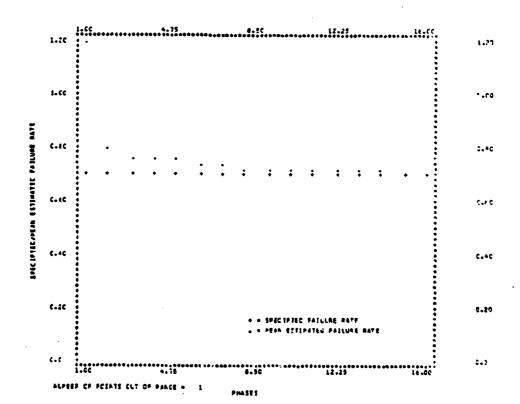
10 11 12 13 ACTUAL FAILURE RATE 0.7063 C.7033 C.7000 0.7000 3.7630 0.7000 0.7000 2.7630 C.2322 FLAPNES TEST TIPE 0.2322 0.2322 0.2322 C.2322 C.2322 5.2:52 PCCEL ESTIPATE 0.8184 0.7570 3.7926 C.7919 C.7857 0.7816 0.7787 5.7747 ESTIMATE ERROR AS FERCENTACE OF ACTUAL PAILLEE BATE 16.51 13.85 13.23 13.12 12.24 11.24 16.67 11.66 SAPPLE STO CENTATION 0.3175 0.2545 3.2765 C.2504 (.2372 0.2349 0.2367 0.7770 CUMLLATINE TEST TIME 23.553 94.270 15.274 25.680 27.822 32.095 21.417 25.540 CLPLLATIVE FAILLRES 13.84CC 15.3100 14.9103 18.5100 20.0400 21.5900 27.1230 24.6430



CASE &

1	5	3	•	5	4	7	•
6.7000	0.7000	0.7000	C.7G00	C.7000	0. 7666	0.7969	0.7555
0-2322	0.2322	0.2322	C.2322	C.2322	0.2322	0.2322	C.2322
1.3531	0.8084	0.7636	0.7644	C.7506	0.7411	0.7355	7.7265
53.30	15.49	9.08	5.15	7.43	1.67	5.07	2.78
1.5499	0.4719	0.3593	C.2855	C-7471	C.2C83	0.1887	0.1500
4-234	8.148	12.464	17.375	27.396	25.432.	29,979	34.273
3.3400	6.1400	9.1300	12.3100	15.3866	18.4460	\$1 *2,66	24.4186
	0.2322 1.3531 53.30 1.5499	0.7000 0.7000 0.2322 0.2322 1.3531 0.4084 53.30 15.49 1.5499 0.4719	0.7000 0.7000 0.7000 0.2322 0.2322 0.2322 1.3531 0.4084 0.7636 63.30 15.49 9.08 1.5499 0.4719 0.3593 4-234 8.548 12.402	0.7000 0.7000 0.7000 C.7000 0.2322 0.2322 0.2322 C.2322 1.3531 0.4084 0.7634 0.7644 63.30 15.49 9.08 5.15 1.5499 0.4719 0.3593 C.2855 4.234 8.548 12.402 17.375	G.7000 0.7000 0.7000 C.7000 C.7000 C.7000 G.2322 0.2322 G.2322 C.2322 C.	6.7000 0.7000 6.7000 C.7000 C.7000 6.3000 6.3000 6.3222 0.2322 0.2322 0.2322 0.2322 0.2232 0.	G.7000 0.7000 0.7000 C.7000 C.7000 0.1000 0.1000 0.7000 0.2322 0.2322 0.2322 C.2322 C.2322 0.2222 C.2322 0.

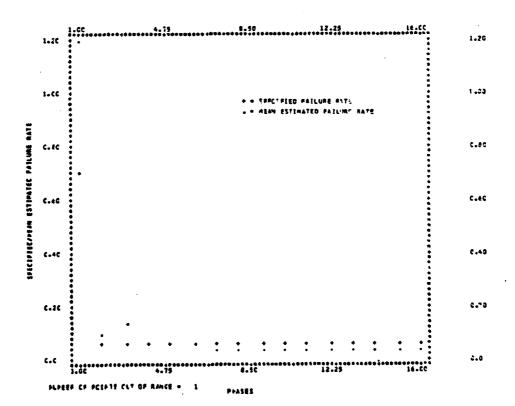
10 11 12 13 14 12 ie ACTUAL FAILURE RATE C.7900 0.7000 G.7000 C.7000 C.100C 3.7000 c.zcċc FLARNEC TEST TIPE 0.2322 0.2322 0.2322 C.2322 C-2322 0.2372 0.2322 C.2322 MCCEL ESTIMATE C-7158 0.7141 0.7165 C.7197 C.7158 0.7161 0.7390 0.7057 ESTIMATE BEACK ACTUAL BALLUPE BATTON 2.25 2.01 2.78 2.81 2.26 7.98 1.37 C.81 SAPPLE STC CEVENTICN 0-1755 0.1612 0.1402 0.1664 C.1820 C-1608 0.1567 0.1365 CUPULATINE TEST TIPE 38.532 +2.403 47.C66 \$1.357 55.636 55.526 64.236 63.542 CLPLLSTIVE FAILURES 27.3100 30.2600 33.3560 24.4500 24.47CC 42.e1CC 45.4900 46.36CC



CASE 1 S (TEP)

1	2	3	4	5	•	7	•
6.7603	0.6580	3.0500	6.0500	C.CSCC	0.0100	2363.3	C.C590
0.2322	3.2564	3.2504	1.2504	2.2504	3.2904	3.2504	1.2904
2.6444	0.0907	0.1364	C-0548	0.0511	0.0524	0.6485	0.0497
217.17	97 .30	177.21	7.64	2,17	5.78	4.01	C.55
3.0392	0.0594	0.5117	C.0532	0.6441	6.6452	0.6424	0.0643
1.045	15.555	30.948	44.032	eC. 571	75.655	\$1.C11	106.100
C.49C0	1.9200	2.3100	2.9200	2.700C	4.4500	5.1700	5.6300
	0.2322 2.6444 217.77 3.0392	0.7C00 0.0580 0.2322 3.25C4 2.4444 0.05C7 277.77 81.3C 3.0392 0.C554	0.7C03 0.0980 0.0500 0.2322 3.25C4 3.2504 2.6444 0.09C7 0.1384 277.77 81.2C 177.21 3.0392 0.C594 0.5117 1.C65 15.595 30.968	6.7C03 0.0980 0.0500 0.0500 0.2321 3.25C4 3.2504 1.2504 2.4444 0.09C7 0.1384 C.0548 277.77 81.3C 177.21 9.64 3.0392 0.0994 0.5117 0.0532 1.065 15.975 30.948 44.032	0.7000 0.0500 0.0500 0.0500 C.050C 0.2322 3.2504 3.2504 1.	0.7000 0.0980 0.0500 0.0500 C.0900 0.0900 0.2322 3.2504 3.	6.7C03 0.0580 0.0500 0.0500 C.C9CC 0.05CO C.C1CC 0.2322 3.25C4 3.2504 1.2504 3.

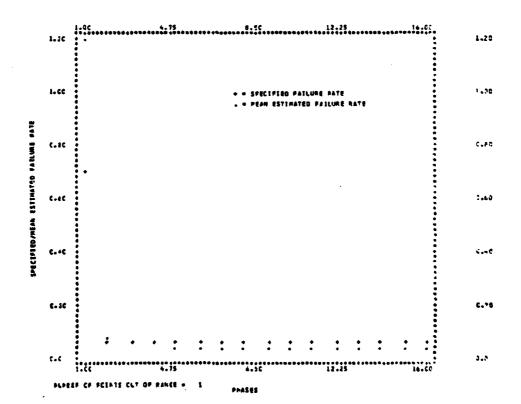
76152	9	10	11	12	13	14	15	1e
ACTUAL PAILUME MATE	6.0500	0.0500	0.0500	c.0500	C.6500	0.0508	0.0500	C. C*?
PLANNEC TEST TIPE	3.2504	3.2504	1.2964	3.2504	1.2504	3.2504	3.2904	3.2534
PCCEL ESTIPATE	0.3454	0.3422	0.0425	6.6423	C.C434	0.0453	0.0453	5.0445
ESTINATE ESTATA LE PROPERTIE PARTIE P	9.20	15.58	14.54	15.44	12.25	5.38	5.48	11-66
SAPPLE STO DEVIATION	0.0317	0.0262	0.0261	C-0253	C.0232	0-6551	0.0200	J. 0194
CLPLEATING TEST TIPE	121.177	136.404	151.504	144.459	141.240	196.131	211.027	226.016
CLPLLATIVE FAILURES	6.5600	7.1300	7.8700	8.6500	5.5100	10.4500	11-2100	11.6770



CASE 3

PPASE	1	5	3	•	5	4	7	•
ACTUAL FAILLRE MATE	0.7000	0.0100	0.0500	C.0500	6.0506	0.0500	C.05C2	3.6563
PLANNEC 1857 TEPE	0.2322	3.2504	3.2504	3.2504	3.2504	3.2504	3.2504	3.2174
PCCEL ESTIMATE	1.6357	0.0018	0.0407	0.0541	C.6482	0.0448	0.0429	7.6444
ESTIMATE EPOCO AS AFACEL AGE OF ACTUAL FAILURE PATE	133.45	43.55	21 .37	8.20	3.50	e.31	14.12	11.31
SAPPLE STC GEVIATION	1.5047	0.0634	0.0514	C.0457	6.6563	0.0353	C.0157	2.0192
CLPLLATIVE TEST TIPE	2.157	31.478	41.451	51.432	121.048	150-665	101.030	217.414
CLOCLATIVE FAILURES	1.3400	3.1560	4.830)	4.4033	7.506	9.1200	10.4350	12.4275

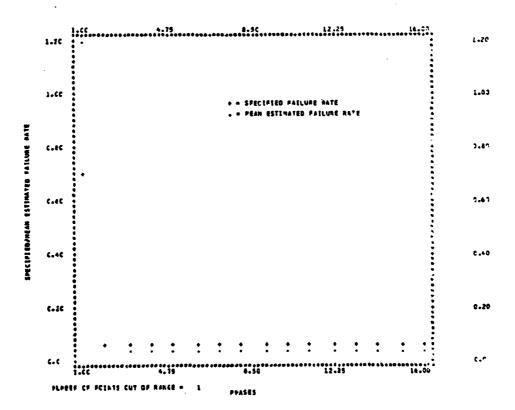
Frasi	9	10	11	12	13	14	1.5	le
ACTUAL PAILURE RATE	C-9506	0.0500	0.0500	C-0500	C.C500	0.0500	0.0500	3.0536
FLANNEC TEST TIPE	2.2564	3.2504	3.2504	1.2504	3.2504	3.2564	3,2504	7.7504
PCSZL ESTIMATE	0.0441	0.0438	0.0436	C.0432	0.0436	0.0450	0.0454	0.045
PATRICIPE STATE ACTULE	11.80	12.42	14.05	13.50	12.46	10.€	6. 66	4.7:
SAPPLE STC CENTATION	3.3201	9.0177	0.0177	C-0174	C-C177	0.6194	0.0153	C. C192
CLPLLATIVE TEST TIPE	240.918	270.784	301-220	131.226	260.931	290.671	420.553	450.738
CLPLLATINE FAILLRES	13.9200	15.4400	16.7599	14.2890	21.8300	21.52GC	23.1766	24.9956



CASE 3 20 ITEPS

PHASE	1	2	3	•	5	•	7	•
ACTUAL PAILLRE FATE	0.7650	0.0100	2026.3	C.0533	G.050C	C.C500	0.0300	2.0400
PLANAEC TEST TIPE	0.2322	3.2504	3.2504	3.2594	3.2504	3.1904	2.2564	3. 2594
PCCEL	1.2522	0.0345	0.0345	C.0392	C.C401	6.000	6.0406	9.9498
PETCENTAGE CF ACTUAL PASSURE SATE	64.61	9.08	ST*62	21.58	16.81	20.00	20.05	18.48
SAPELE STO CEVENTION	1.4242	0.0438	3.017é	C-01-2	C.CL65	3.C741	0.0129	0.0121
CUPULATIVE TEST TIME	4.323	44-115	124.571	184.251	144.255	304-437	<u> </u>	424.273
CLPLLATIVE FAILURES	2.7500	5.810^	8.4700	11-*000	14.5430	17.9100	36.9100	?4.6100

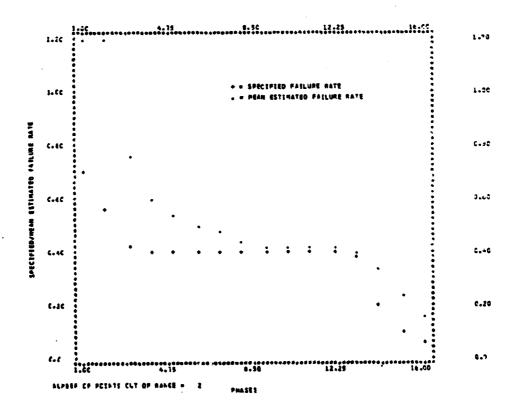
PFA 58	ş	10	11	12	13	14	15	16
ACTUAL PAILURE PATE	6-0 506	0.0:00	C-0500	£.0560	c.csec	0.0300	0.0100	C.C500
PLANNEC TEST TIPE	3.2564	3.2504	3.2564	3.2504	3.2564	3.2504	3.2904	3.2554
PCGEL ESTEMATE	C.3406	0.0405	0.0413	0.0415	C.C425	0.0429	0.6423	0.642
PARCEPTAGE PARCECTURE	18.84	18.50	17.39	17.06	15.04	15.64	15.47	**.0
SAPPLE STC CEVIATION	0.0110	0.0168	0.0105	0.0103	C-C111	0-0110	C.C1 CR	0.0112
CUPULATIVE TEST TIME	444.635	545-173	404.765	645.234	724.717	784.785	444.506	505.039
CLPILATINE FAILURES	24.9400	29.8000	32.9300	25.8900	35.1000	41.55CO	44.7350	47.66SG



5 178PS

PPASE	1	z		•	5	•	7	•
ACTUAL PAILLES MATE	C. 7000	0.550	0.4250	C.4050	C.400C	0.4000	c.4666	c.4ccc
PLANNEE SEST TIPE	0.2322	0.2455	0.3424	C.4313	0.4341	0.4063	C.4C43	6.4642
PCCEL ESTIPATE	3.4375	1.8621	0.7642	C.5940	C.:433	0.4542	0.4879	0.4354
RETIDATE BERCH AS REACENTICE OF ACTUAL PAILUPE PATE	321-00	227.66	79-81	47.15	25.43	23.56	20.73	1.24
SAPPLE STC CEVIATION	4.9794	2.3842	0.7915	C.4386	C.480C	9.4764	0.2664	3.2e26
CLPLLATIVE TEST TIPE	1.074	2.418	4.202	6.049	7.942	5.843	11-657	17.580
CLOLLATIVE SAILLAES	C-648C	1.5100	2-1102	2.9:90	3.4300	4.2700	5.3700	5.7700

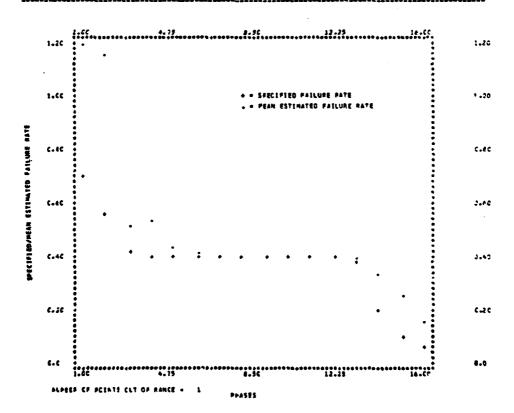
15 14 PFASE 9 10 11 12 13 14 C.+CCC 0.7750 6.2000 C-1000 e.cec ACTUAL PATLURE RATE C.4C38 0.4000 6.4003 5.2504 SLANNEC TEST TIPE 6.4043 0.4663 Q.ELZe 1.6252 0.4643 C.4G63 C.4334 PCCEL ESTIMATE 0,4266 0.4259 0.4159 C-4204 C.4003 0.2154 0.2466 C. 1550 ESTIMATE EFACE ASSESSED 4.57 5.11 4.75 45.41 145.85 224.40 6.65 6.45 SEPPLE STC CEVIATION C.2152 0.1943 0-1891 £-1581 C.2027 0.1483 0.0977 C. C567 CUPULATIVE TEST TIPE 17.319 23.079 24.240 34.776 44.364 15.442 14.166 21.049 27.6400 10.0600 10.6900 CUPELITIVE FAILURES 4.5830 7.3400 8.3700 4.78CC 1.3800



CASE 4

P+416	1	1	3	•	5	•	7	•
ACTUAL PATLLAG BATE	¢.7660	0.5960	0.4250	6.4050	C.4COC	0.4060	C.4CCC	0.4705
PLANAC TEST TIPE	0.2322	0.2555	0.3424	C.4013	E.4C63	0.4(43	0.4663	C.4Ce3
PCCEL ESTIMATE	2.9592	1.1648	0.5144	6.5460	C.4436	0.4136	0.3964	C.3957
SETIMATE EARCH AS SESCENTAGE CF ACTUAL SAILUSE FAIR	322.79	111.77	21 .c3	34.81	16.95	3,45	0.1e	1.06
SAPELE STC CENTATICA	7.4530	3.3214	0.3513	C.5357	G.2234	G.?165	C-1741	C.1626
CLPLLATINE TEST TIME	2.136	4.487	8,462	12.133	1:.442	14-413	23.410	27.195
CLPLLATIVE FAILLRES	1.5400	2.9400	4.1466	5.8430	7.9190	E.e4C0	16.1000	11.5756

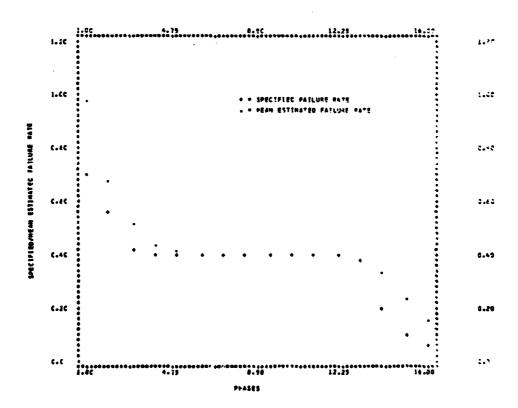
P+45E	9	10	11	15	13	14	15	1*
ACTUAL PAILURE RATE	C-4006	0.4663	0.4600	C.4000	C.3750	0.2560	6.1000	C. 6500
FLANNEC TEST TIPE	0.4663	0.4063	0.4Ce3	C.4C43	C.4334	G-4126	1.6257	7.7504
MCCEL ESTIMATE	6.3545	0.3927	0.3932	C.3,548	C.3931	0.3440	C-2544	0,1571
PRICE PROPERTY AND ACTUAL	1.37	1.84	1.70	1.31	4,24	72.C2	154.61	214.20
SAPELE STO CEVEATION	0.1511	0.1524	0-1344	G-1347	0.1175	0-0456	0.0658	0.0233
CLPLLATIVE TEST TIME	30.943	34.723	38,459	42.187	46.178	53.427	68.585	54.231
CLPLLATIVE FAILURES	13.0700	14.4500	14-3100	17.5730	15.160C	20.000	22.3600	23,5227



CASE 4

Phate	1	2	3	•	5	•	1	•
ACTUAL FAILURE RATE	6.7600	0.5:00	0.4250	6.4050	C-400C	6.4268	C.4966	C.456C
PLANACE TEST TIPE	0.2322	0.2955	0.3824	C.4013	6.4663	0.4003	0.4Ce3	C.4C63
PCCEL ESTIPATE	0.9732	0.4765	C.5140	0.4344	C.4171	0.4093	0.4017	0.4646
PRICE TACE OF ACTUAL PRICES AS ACTUAL	39.C2	23.37	21.59	7.00	4.78	1.32	C.43	٠.•٠
SAPPLE STC CEVIATION	0.7642	0.4140	0.2553	C-1704	C-1717	0.1370	0-1247	0.1190
CLPCLATIVE TEST TIME	4.313	9.758	14.674	24.303	22.756	34. 122	44.799	54.188
CUMCLATINE FAILURES	2.9900	i'utu	#.B70a	11.7100	14.7166	17.7400	20.8155	24.0300

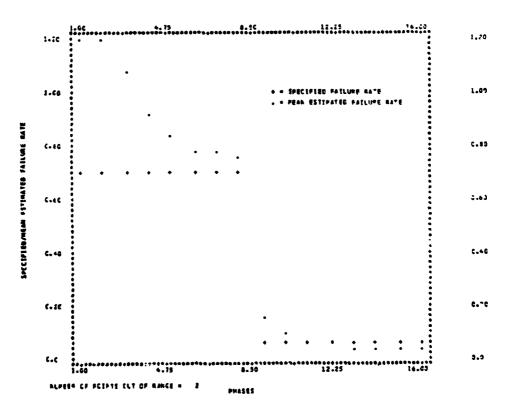
*****	•	10	11	12	13	14	15	16
ACTUAL PAILURE MATE	C.4006	0.4000	0.4000	C-4000	C.375C	6.2560	C.1033	0.0:3
PLANNEC TEST TIPE	C.4C43	0.4663	0.4043	C.4Ce3	C-4334	0.8124	1.6752	1.753
miter Ettimate	0.3559	0.4033	0.3561	C.3941	C.3861	0.2766	0.24-2	2.157
FETTHER STORES	0.03	0.43	0.48	1.49	Z.97	48.29	144.21	231.70
SAPPLE STC CEVENTION	C-1101	9.1167	0.1923	C-0970	C-C518	9.0766	3.0454	7.027
CLPLLATENE TEST TIPS	41.474	49-123	74.472	84.172	92-154	107.194	137.320	197.43
CLPLLATINE FAILURES	27.0400	30.2200	33.2300	36.1700	25.0600	42.0400	44.8000	47.850



CASE S

ı,	2	3	•	•	•	,	•
0.7000	0.7000	0.7600	Ç. 79 0 9	C.7090	0.7000	0.7010	9. 7000
4-5155	0.2322	0.2322	(.2322	C.2322	4.2322	0.2322	0.2127
1.4870	1.3547	1.3840	(.9104	C.4364	0.7754	0.7719	3.7577
112.43	93.42	54.54	31.20	19.77	10.77	10.27	4.24
1.2429	1.8888	0.9333	C.620÷	0.4628	9.3504	0.3441	0.3142
2.100	4.212	6.455	8 9	10.744	12.532	19.076	17.222
1.3460	3,7800	4.4100	1.6500	7.3400	8.6100	10.1400	11.6400
	0.7000 0.2122 1.4073 112.43 1.2429 2.100	0.7000 0.7000 0.2322 0.2322 1.4873 1.3547 112.43 93.42 1.2429 1.4888 2.160 4.212	0.7000 0.7000 0.7000 0.2322 0.2322 0.2322 1.4073 1.3547 1.3446 112.43 93.02 54.44 1.2429 1.8888 0.9333 2.100 4.312 0.455	0.7000 0.7000 0.7000 C.7000 0.2122 0.2322 0.2322 C.2322 1.4670 1.3547 1.0444 C.9184 112.43 93.42 54.54 31.20 1.2429 1.8888 0.9333 C.6204 2.160 4.212 6.495 8.609	0.7000 0.7000 0.7000 C.7000 C.7000 0.2122 0.2322 C.2322 C.	0.7000 0.7000 0.7000 C.7000 C.7000 0.2000 0.2020 0.2322 0.	0.7000 0.7000 0.7000 C.7000 C.7000 0.2000 0.7000 0.2122 0.2322 0.2322 C.2322 C.2322 0.23222 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.23222 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.23222 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.23222 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.23222 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.2322 0.23222 0.2322 0.2

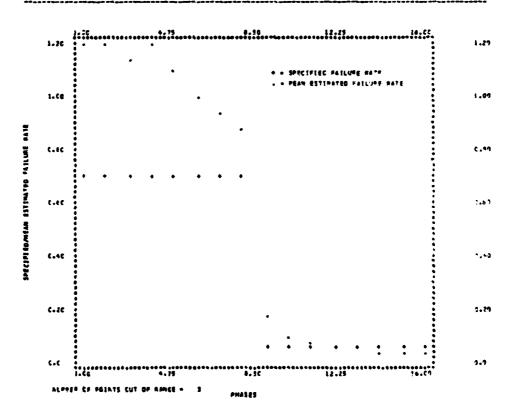
#ra ! !	•	10	11	12	13	14	15	10
ACTUAL PAILURE RATE	8.3536	0.0107	0.0500	C.0500	0.0503	0.0500	3.0500	3.0572
PL49>8C 1837 TI*E	3.2504	3.2564	3.2504	3.2504	3.2504	2.7504	3.2504	1.2524
MISEL BITIMATE	0.1543	0.0529	0.0657	C.0565	0.6495	0.0442	0.0436	0.6419
GETTINITE EFECT AS BIRCENTACI OF ACTUAL PAILURE NATE	214.05	45.42	34.45	12.96	c.25	7.44	12.45	16.25
SAPPLE STC DEVIATION	0.0502	0.0320	0.0249	0.0144	0.0125	0.0134	9.0122	0.0114
CLPLLATING TEST TIME	47.306	77.465	107.414	137-666	167.677	197.535	227.437	257.471
CUPLLATIVE FAILURES	13.0600	14.9500	16.0370	17.2900	16.7300	20.2900	21.6e3G	23.3830



CASE 5

PP4 5 E	1	5	3	•	•	•	7	•
ACTUAL PARLUME MATE	6.7000	3.7550	6.7003	6.7070	6.7009	6. IC96	0.70:0	2. 7776
PLANACE TEST TEPS	0.2322	0.2122	0.2322	C.2322	C.2322	6.2322	0.2322	2.5155
PCCEL ESTIMATE	7.9634	1.7400	1.1444	1.6976	1.0905	1.0042	9.9540	0.4712
ESTIMATE ERACE AS BEACTATAGE OF ACTUAL BAILLEE BATE	\$63.44	151.43	43 .44	142.52	55.79	•I.C	14.65	74.44
SAPPLE STC DEVENTION	27.8614	1.4287	1.044)	9.4117	C.5275	8.7431	0.5574	0.444
CLHLESTING TEST TIME	1.078	2.143	3.241	4,315	:.:::	4.461	7.524	8.410
CUPULATIVE FAILURES	0.4300	1.3600	1.9503	1.6403	1.1000	4.1100	9.1709	5.0706
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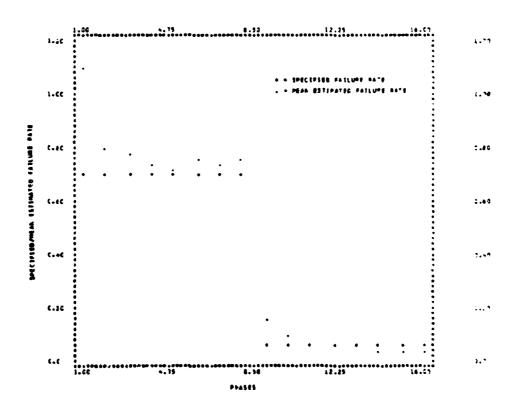
Ph/158	•	fc	11	12	13	14	15	:6
ACTUAL PAILURE RATE	C.3500	0.0:00	0.0500	C.0503	C-0500	0.0503	0.0400	9.0170
FLANNEE 1217 TIME	3.2554	3.2904	3.2504	2,2504	3.2504	3.2964	1.2504	3.25**
MCCEL ESTIMATE	C.1735	0.6434	0.3713	C.0010	0.0524	0.6468	0.0452	0.0437
ESTIMATE BARCH AS PRACECTAGE OF ACTUAL PAILURE BATE	247.64	87.46	41.45	22.09	5.11	2.45	₹.el	12.07
SEPFLE STC CEVIATION	0.1239	0.0415	0.0288	0.0272	2.0225	3.6511	0.02:0	0.0173
CLPCLATENE TEST TIPE	23.741	36.431	53.503	44.700	63.615	98.725	113.771	128.757
CL-LLATIVE FAILLRES	4.5300	7.1400	7.9303	4.7100	1.3700	10.1703	10.0200	11.4700



CASE 5

P>4:6	l.	1	3	•	5	4	,	4
ACTUAL PAILURE RATE	8.700	3.7660	3.7030	(.7003	6.1036	c.:cee	0.1760	7, 7,77
PLANEC 1857 TEPE	0.2372	0-2327	0-5355	0-5335	6.2322	C-2122	0.2*77	9.2327
*CE1. #\$T[*4*#	1.0561	8.7544	0.7445	C.7-91	C.7287	0.1219	0.1447	7, 7551
PATENTE PROTECTION OF PATENTE PATENTE	34.58	13.41	12.57	4.45	•.10	7.36	7.11	7.47
SAPPLE STE DEVIATION	0.8:40	0.4466	0.3424	C. 3081	(.1,35	0.2863	2.7404	1,7114
CLPLLATIVE 7857 7198	4.210	8.595	12.402	17-214	41.527	29.754	35.700	34.132
CLPLLATINE FAILURES	3.3433	9.000	8.4200	11-4400	14.5766	17.4400	20.9400	44.2330

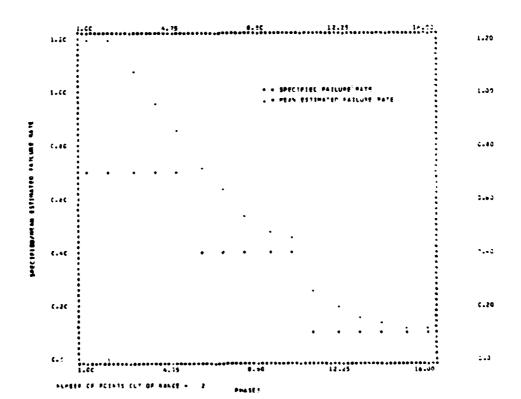
#+#!! 	•	10	11	12	13	٠,	1.9	۰,
SCILAL PATEURE SATE	6.3900	0.0500	0.3100	(.2592	C.C530	0.:966	C.05:0	9.0433
FLANNEC TEST TEPS	3.2504	3.2564	3.2524	1.2534	1.2504	3.2964	2.2524	3.25%
#C22L #5" "##"#	C.1 013	3.0953	0.3699	C. 0985	0.3511	0.3472	0.0414	J. (4) e
PARTY STACE AS LAL	223.55	90.04	39.83	14.55	2.29	5.10	12.28	.6.45
SAMPLE STO DEVIATION	0.0377	3.3200	3.0154	C-0137	0.0150	9. (1 Ca	0.0049	0.::**
CUPELATIVE TEST TIPE	14.364	154.544	214.544	234.557	127.177	254.557	45*.436	915.912
CUPLISTIVE PAILLARS	27.1600	30.2403	32.0560	14.9100	14.4166	41.5460	44.5700	47. PEG:



CASE &

P+ # 1 E	1	2	3	•	5	4	7	4
ACTUAL FAILURE BATE	c.1003	9.1963	9.7000	6.7000	¢.7000	6.4663	3.4981	0.400
FLARAGE 1857 TIPE	0-2322	0.2322	0.2222	C.2322	C.2322	0.4543	0.4063	0.4747
PCC51 #511-41F	4.1372	3.2307	1.3644	(.9>94	2.8095	3.7201	0.4357	3.443
ESTIMATE ETATE AS PRACESTACE OF ACTUAL PRICES BATE	1002.45	341.53	55.55	37.25	24.22	41.13	:5.54	35.09
SIPPLE STC CENTATION	41.0542	12.4539	0.8204	C.8237	C-4671	0.5166	0.4158	0.2542
CLPLESTIVE TEST TIPE	1.361	2.128	3.209	4.305	5.374	7-210	5.075	13.468
CLPLLATINE PAILLRES	C.7400	1.4500	2.2200	2.8430	3.5500	4.4600	5.2500	6.C13*

16 11 iz 13 15 16 1.1337 ACTUAL PAILLRY MATE C.4CCC 0.4000 0.1000 C.1700 0.1909 0.1200 0.1330 PLANNEC TEST TIME 1.6252 0.4043 0.4663 1.6252 1.6752 1. c252 1.4252 1.e252 MODEL ESTOMATE 0.2601 C.1951 0.4852 0.4558 C.lode 0.1381 3.1261 2.1145 Hillian Francis 21.30 163.15 \$5.37 SAMPLE STE DEVIATION 0.1126 C-0776 0.3529 0.2156 0.2(e3 C-0405 0.0474 CUPALISTIVE TEST TIPE 12.454 44.670 7.3400 10.4000 11.4000 12.1500 CUPLLATINE PATLLARS 4.3903 4.9300 1.7005

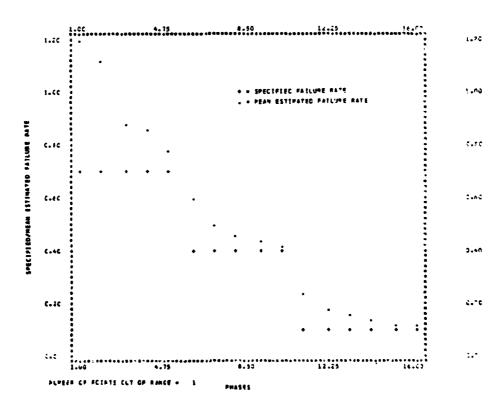


CASE 6

PPASE	1	5	3	•	5	•	7	8
ACTUAL FAILURE RATE	0.7600	0.7660	0.7000	c.7300	C.7606	0.4966	C.4C:E	5.4005
PLANNEC TEST TIPE	0.2322	0.2322	0.2322	C.2322	6.2322	0.4(43	0.4643	7.4663
PCCEL ESTIPATE	1.7872	1.1281	0.0611	C.8621	G.7812	0.5977	0.5077	0.4506
ESTINATE EFRCE AS FECENTACE OF ACTUAL FAILURE RATE	155.31	61.16	25 .86	. 23-16	11.55	45.43	76.42	17.45
SAMPLE STC GEVENTION	1.7442	0.9507	0.5554	C.4681	0.9682	0.2647	C.2066	3.1654
CLALLATIVE TEST TIME	2.158	4.277	6.441	9.553	10.725	14.459	16.287	22.093
CLPLLATIVE PAILLARS	1.3500	3.0100	4.3300	5.9200	7.2400	8.6ecc	9.4600	11.2500

10 11 12 13 14 15 16 SCTUSE PAILURE RATE 0.4000 0.4660 0.1003 C-1000 0-1000 0.1000 3.1ccc 0.1000 PLANNEC TEST TIPE 0.4663 1.6252 1.6252 1.6252 PCGEL ESTIMATE 0.4355 0.2492 C-1983 6.1554 0.2146 0.4184 0.1366 0.1236 FETTINETE FERCE LE PARTIE 8.99 4.61 149.24 88.29 55.45 14.50 26.55 22.+1

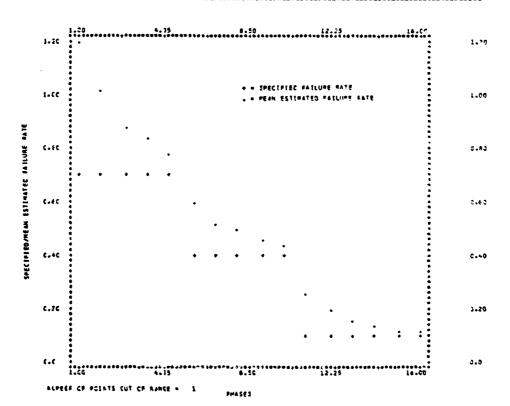
SEMPLE STC CEVIATION 0.1044 0.1469 C.0576 C.C423 0.0383 0.0295 CUPULATIVE TEST TIPE 44.552 74.439 25.631 29.565 19.418 85.120 104.331 119.3Ce CLPLLATIVE FAILURES 12.7500 14.1900 15.7600 17.4500 15.CZQ0 20.5501 22.1800 23.740C



CASE 4 20 ETEPS

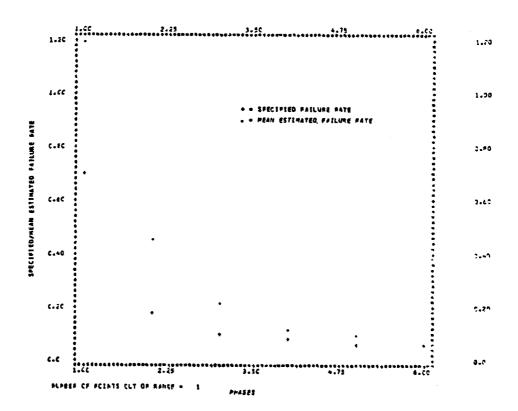
1	2	3	•	5	4	1	
0.7000	0.7600	0.7030	£-7900	6.7600	6.4000	2.4900	J. 4636
0.2322	0.2322	0.5355	0.2322	C.23ZZ	0.4643	0.406?	0.4(63
1.2777	1.0114	0.8886	6.8352	¢.7894	0.4663	1.5260	0.4555
42.53	44.48	26.94	19.32	12.78	92.C8	21.49	23.56
1.2143	0-6270	0.4C78	0.3046	C.2523	G-1787	9-1497	0.1374
4.294	8.561	12-842	17.130	21.419	28.505	36.410	43.831
2.7700	ن.::::	5.2305	12.3000	15.2100	18.0760	21.0206	24.3000
	0.7C00 0.2322 1.2777 62.53 1.2163	0.7000 0.7000 0.2322 0.2322 1.2777 1.0114 82.53 44.48 1.2163 0.4270 4.294 8.561	0.7C00 0.7C00 0.7G00 0.2322 0.2322 0.2322 1.2777 1.0114 0.8886 82.53 44.48 26.94 1.2163 0.6270 0.4C78	0.7000 0.7000 0.7000 0.7000 0.2922 0.	0.7000 0.7000 0.7000 C.7000 C.7000 0.2322 0.2322 0.2322 0.2322 C.2322 1.2777 1.0114 0.8886 C.3352 C.7894 82.53 44.48 26.94 19.32 12.78 1.2163 0.6270 0.4078 0.3046 C.2523 4.294 8.561 12.842 17.130 21.619	0.7000 0.7000 0.7030 C.7000 C.7000 C.4000 0.2322 0.2322 0.2322 0.2322 C.2322 C.4663 1.2777 1.0114 0.8886 C.8352 C.7894 0.4083 82.53 44.48 26.94 19.32 12.78 52.08 1.2163 0.6270 0.4078 0.3046 C.2523 C.1787 4.294 8.561 12.842 17.130 21.419 28.505	0.7000 0.7000 0.7030 C.7000 C.7000 C.4000 3.4000 0.2322 0.2322 0.2322 0.2322 0.2322 0.4063 0.4062 1.2777 1.0114 0.8886 C.8352 C.7894 0.4063 1.5260 82.53 44.48 26.94 19.32 12.78 52.08 21.46 1.2163 0.4270 0.4078 0.3046 C.2523 C.1787 0.1497 4.294 8.561 12.842 17.130 21.419 28.505 36.410

# + A S E	9	10	11	12	13	14	15	7.6
ACTUAL FAILURE RATE	C-4CCB	0.4003	8.1000	C.1000	0.1000	0.1000	0.1 000	0.1000
PLANNEC TEST TIME	0.4063	0.4063	1.0252	1.0252	1-6252	1-4252	1.4252	1.6252
PTCEL STIMATE	0.4551	0.4369	0.25ál	C+1931	C.1571	0.1355	6.1213	0.1116
RETIDATE BRICK AS RESCENTAGE OF ACTUAL RESCUE FATE	13.76	9.72	154.09	53.06	57.10	25.47	21.21	11.65
SAMPLE STO CEVIATION	0-1217	0.1213	0.3458	C-0431	0.0334	0.0376	0-0247	0.0208
CUMULATIVE TEST TIME	51.373	58.856	818.88	118.457	148.459	176.515	2CE.549	234.617
CLPLLATIVE FAILLRES	27.0300	30.0400	33.17GC	36.4600	35.4362	42.7500	45.7630	48.2760



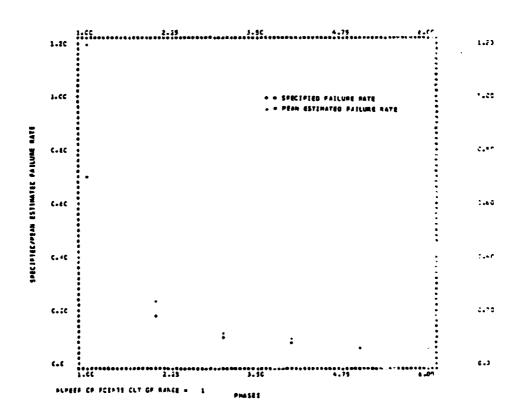
CASE 7

FF4 SE	ı	2	3	4	5	4
ACTUAL SAILURE RATE	6.7000	0.1400	0.1360	C.G7e0	C-3e00	9.0500
PLANNEC TEST TIME	9-5:55	0.9029	2.5732	2-1284	2.7CE6	3.7504
MCCEL ESTIMATE	2.8664	0.4555	0.2102	C-1207	0.0989	0.244
ESTIMATE ERROR AS PERCENTAGE OF ACTUAL PILLER BATE	283.92	155.26	98.29	44.74	64.89	26.53
SAMPLE STO DEVIATION	2.2451	0.3773	0.2323	9-2691	C.1488	0.0529
CLULLATIVE TEST TIME	1.082	5.233	12.335	22.415	. 34.915	45.550
CUMULATIVE FAILURES	C. 9000	1.4666	2.1100	2.6800	3.450C	4.2000



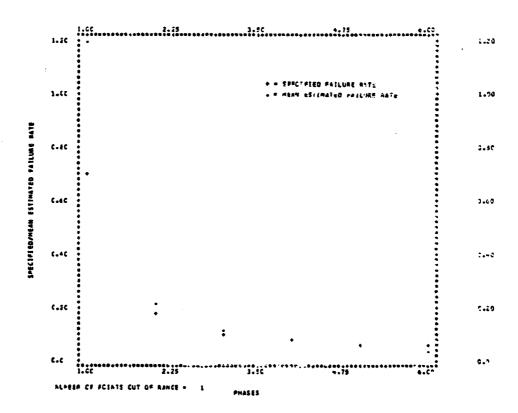
CASE 7

FHASE	1	2	3	•	5	•
ACTUAL FAILURE RATE	6.7000	7.1800	0.1063	C-0760	C - C 60 C	6.0500
FLANGE TEST TIME	0.2322	0.9029	1.5332	2.1384	2.7086	3.2*04
PCGEL ESTEPATE	1.4664	0.2349	0-1186	C.3435	C.C669	0.0525
STIMATE ERRCA AS BERGERTAGE OF ACTUAL FILLISE SATE	169.49	30.48	12.05	22.99	1.51	4.51
SAPPLE STO DEVIATION	1.9720	0.1445	0.0705	C.1298	C.C258	0.0220
CLPLLATIVE TEST TIPE	2.131	10.442	24.658	44.542	65. 742	\$5.645
CUPLLATIVE FAILURES	1.5200	3.0500	4.5303	\$.57GC	7.4000	9.3430

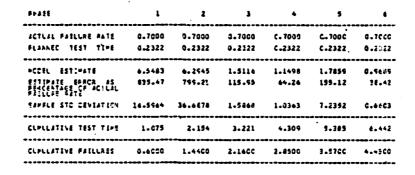


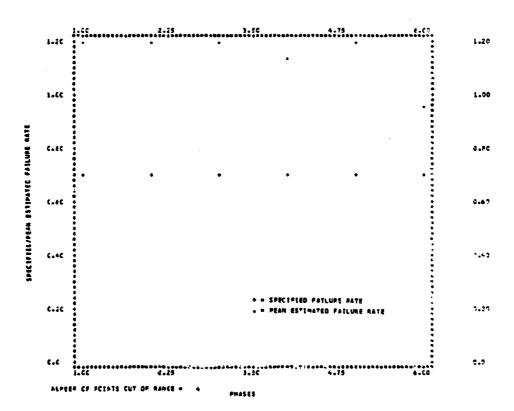
CASE 7

99458	1		3	•	•	•
ACTUAL FAILURE RATE	C.7300	0.1860	3.1063	0.0760	3343.3	0.0:63
PLANNEC TEST TIPE	0.2322	0.5629	1.5332	2.1384	2.7084	3.2504
PCDEL SSTEMATE	1.2610	0.2117	0.1117	£080.3	C.C411	6.0496
ESTIMATE ERRCE AS BERCENTAGE OF ACTUAL PAILURE PATE	£3.00	17.40	5.34	5.43	1.77	C.73
SAMPLE STC CEVENTICE	1.1594	0.1266	0.0577	0.0327	C.0204	0.6155
CLPLLATIVE TEST TIME	4.285	21.018	49.447	64.959	124.354	195.721
CLMLLATIVE FAILUPES	3.0500	6.0200	8.8200	11.9930	14.9500	17.6000



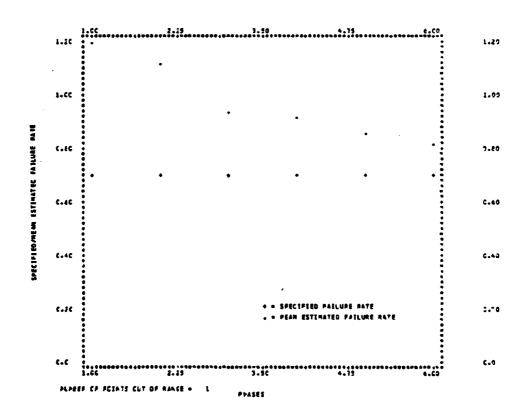
CASE &





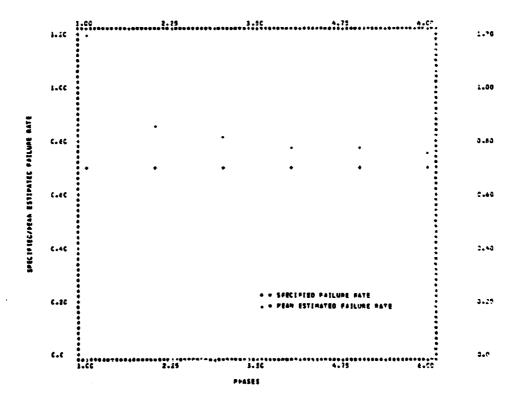
CASE &

PEASE	1	2	3	•	5	ŧ
ACTUAL FAILURE RATE	C.7000	0.7003	0.7005	C. 7000	C.7309	9.7363
FLAAREC TEST TIPE	C.2322	0.2322	0.2322	C.2322	C.2322	0.2122
ACCEL ESTIMATE	1.9139	1.1168	C.9457	C.\$227	C.eell	3.8247
ESTIMATE ERROR AS PERCENTACE OF ACTUAL PAILURE BATE	172.98	58.49	35 - 67	31.82	23.01	17.62
SAMPLE STC CEVENTICS	2.2062	0.9809	0.6110	C.4248	C.4651	0.3530
CUPALISTING TEST TIPS	2.119	4.202	6.362	0. ⇒01	10.645	12.788
CLPCLATINE PAILLARS	1.4200	3.1100	4.7700	6.4300	7.0100	9.3566



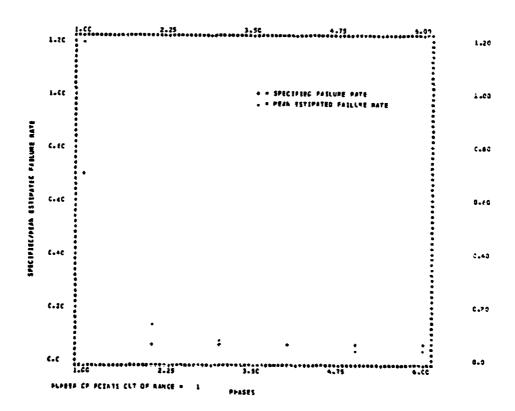
CASE 6

PPAST	1	2	3	•	5	•
ACTUAL PAILURE RATE	0.7000	0.7666	0.7060	C.7003	C.7CGC	0.700
PLANNEC TEST TIPE	0.2322	0.2322	0.2322	C.2322	6.2323	0.2122
PCCEL ESTIPATE	1.1574	0.8490	0.8298	0.7837	C.7802	0.7450
ESTIPATE ERRCR AS PEACEATAGE OF ACTUAL FAILURE WATE	71.04	24.14	18.54	11.95	11.44	1.40
SAMPLE STO DEVIATION	1.0731	0-4482	0.3554	C.2971	C.262C	.C.2362
CUPLIATINE TEST TIME	4.301	8.551	12.843	17.144	21.424	25.450
CLPLESTINE PAILLRES	2.9200	6.0000	9.2100	12.1900	15.2700	14.3266



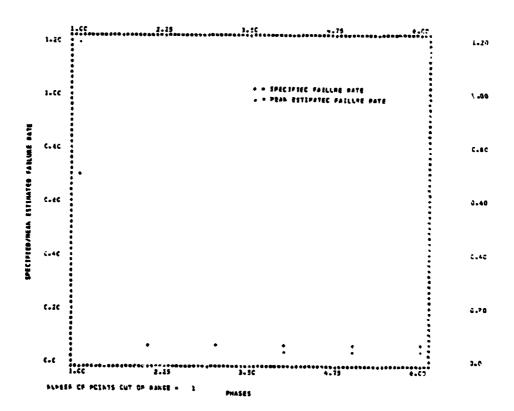
CASE 9

PPASE	ı	2	3	•	5	•
SCTUSE FAILURE RATE	C.7C00	0.0563	0.0520	C.250C	C.0500	0.0503
PLANNEC TEST TIPE	0-2322	3.2504	3.2504	3.2504	3.2504	3.2504
MICEL ESTIMATE	3.0001	0.1346	0.0813	C.0>+3	C.C493	0.3484
PETIMATE BEACH AS PERCENTAGE OF ACTUAL FAILURE BATE	326.59	165-20	62.64	13-45	2.04	3.25
SAMPLE STE CENTATION	3.3772	0.4560	0.0523	C.0539	0.0354	0.0257
CUPLLATINE TEST TIME	1-064	16.044	30.714	45,400	40.454	75.456
CLPLLATIVE FAILURES	0.7100	1.5100	2.4760	3.1300	1.8400	4.4466



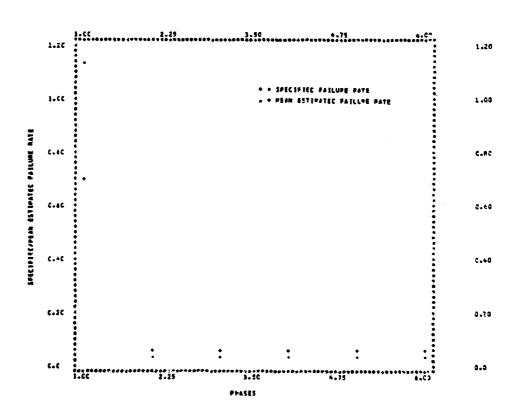
CASE •

99448	ı		3	•	5	t
ACTUAL FAILURE RATE	0.7030	0.0500	6.0503	C.0500	C.050C	6.0565
FLARAGE 1851 TIPE	0.2322	3.2504	1.2904	1.2504	3.2504	3.2164
PCCEL ESTIMATE	1.2220	0.0912	0.0506	0.3392	C.C+L#	0.(429
SETTEMATE ESTER AS BERCENTAGE OF ACTUAL FAILUSE PATE	14.57	2.43	1 -22	21.49	16.41	15.07
SAMPLE STC GENTATION	1.0580	1090.0	0.1258	4.0227	C.CZ3C	3.6249
CLULLATINE TEST TIME	2.139	32.163	42.384	\$2.021	121.829	12".788
CUPULATIVE FAILURES	1.4730	2.8500	4.360C	5.9600	1.6566	4.1 4C3

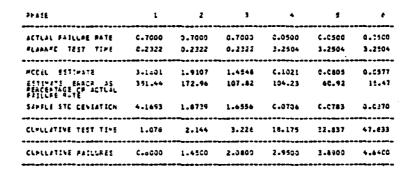


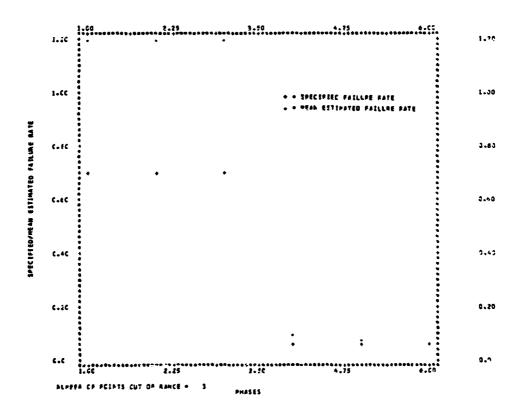
CASE \$

ı	1	3	4	5	•
C.7CGC	6.0500	0.3500	C.0538	C.2500	0.0500
0-2322	3.2504	3.2504	3.2504	3.2504	3.2504
1.1359	0.0449	0.0376	5.0392	C.6375	9.9388
42.27	16-11	24.46	21.63	24.94	22.44
1.1273	0.0338	0.0163	C-0511	C-0144	0.0132
4.308	64.767	124. 366	164.253	244.683	204.580
2.8000	5.5403	8.5600	11.4400	14.5200	17.0563
	0.2322 1.1359 42.27 1.1273	C.7CCC G.09CO 0-2322 3-2504 1.1399 0.0449 42.27 1C-11 1.1273 0.0238 4.308 44.787	C.7CCC G.09CO 0.3900 0.2322 3.2504 3.2504 1.1359 0.0449 0.0378 42.27 1C.11 24.46 1.1273 0.0338 0.0163	C.7CCC G.09CO 0.0900 C.0500 0.2322 3.2504 3.2504 3.2504 1.1359 0.0449 0.0374 C.0392 42.27 1C.11 24.46 21.63 1.1273 0.0238 0.0163 C.0211	C.7CGC G.05CO 0.0500 C.0500 C.0500 0.2322 3.2504 3.2504 3.2504 3.2504 1.1359 0.0449 0.0374 C.0392 C.0375 42.27 1C.11 24.46 21.63 24.94 1.1273 0.0338 0.0163 C.0211 C.0144 4.308 64.787 124.286 164.293 244.483



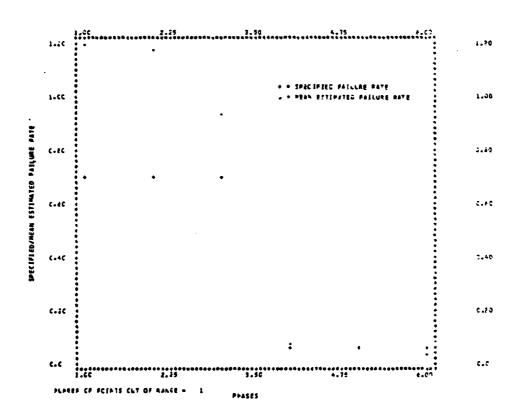
CASE 10 S-lteps





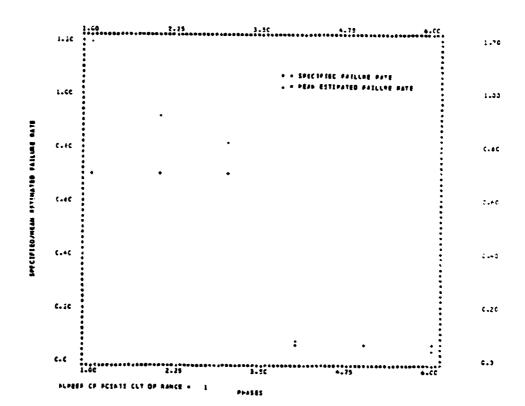
CASE 10

1	2	3	•	5	•
0.7000	9.7000	0.7000	C.050G	C.C500	0.2500
C.2322	0.2322	0.2322	3-2504	3.2504	3.2504
17.0544	1.1667	G. 93C4	C.086 l	6.0537	0.0-55
2422.65	65.81	32.94	72.14	7.43	8.50
******	1.0294	0.0296	C-0461	6.0234	G.C186
2.134	4.277	6.418	36.133	66.232	96.210
1.5200	3.0200	4.5200	6.1400	7.5000	5.1300
	0.7000 G.2322 17.0544 2422.G5	0.7000 0.7000 6.2322 0.2322 17.6544 1.1887 2422.05 65.81 4************************************	0.7000 0.7000 0.7000 0.2322 0.2322 0.2322 17.6544 1.1887 0.93C6 2422.C5 65.81 32.94 ************************************	0.7000 0.7000 0.7000 C.0500 C.2322 0.2322 0.2322 3.2504 17.6544 1.1687 0.93C6 C.0661 2422.C5 65.81 32.94 72.14 ***********************************	0.7000 0.7000 0.7003 C.0500 C.C500 C.2322 0.2322 0.2322 3.2504 3.2504 17.6544 1.1887 G.93C4 C.0861 C.2537 2422.C5 65.81 32.94 72.14 7.63 ***********************************



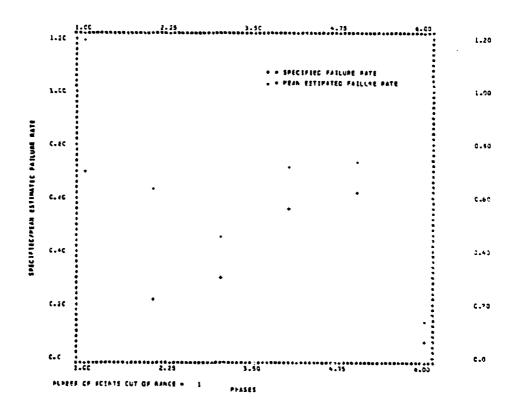
C456 10

6+458	ı	2	3	•	5	•
ACTUAL PAILLAS BATE	0.7300	0.7668	0.7500	C.0500	C.35GC	0.0503
PLANNIC TEST TIME	0.2322	0.2327	0.2357	1.2504	1.7504	3.7504
PIDEL ESTEPATE	1.2948	3.9132	0.8192	£.0769	C.C5C3	0.0423
REACTOR FOR ACTUAL FAILURE FAILURE	17.24		17.03	53.77	£.44	15.47
SAFFLE STE CENTATION	1.1601	0.5344	0.4160	C.0257	C.C174	0.0119
CUPULBTIVE TEST TIPE	<. i50	8.535	12.825	72.919	122.273	193.287
CLACLISTIVE FAILURES	3.1500	6.3 100	5.2763	12.0400	15.0500	18.2466



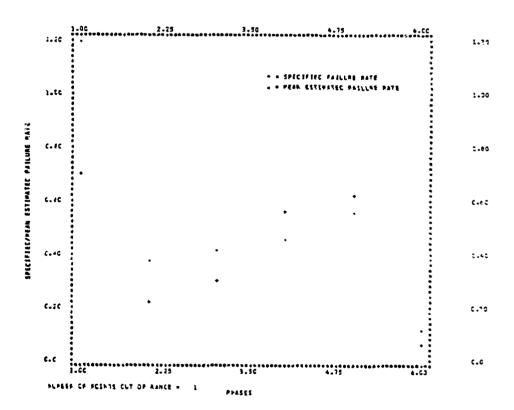
CASE 11 5 . (E):

92449	ı	2	3	•	5	•
ACTUAL FAILURE RATE	0.7000	0-2250	0.3000	0.5503	C.6100	0.2500
PLANNEC TEST TIPE	0.2322	0.7223	0.5417	G.2955	C-2664	3.2564
PCDEL ESTEMATE	2.1895	0.6307	0.440 L	C.7153	C.7334	0.1348
ESTIPATE EARCH AS PERCENTAGE OF ACTUAL PARLUSE MATE	212.79	100.33	53.30	30.06	20.24	173.37
SAPPLE STC DEVIATION	2.3593	0.7244	0.3505	C-8522	0.6498	0.0641
CLPLEATIVE TEST TIPE	1.061	4.234	4.850	8.174	<.398	24.211
CLPLLATIVE FAILURES	C.44C0	1.400	2.3200	2.2300	4.0400	4.8203



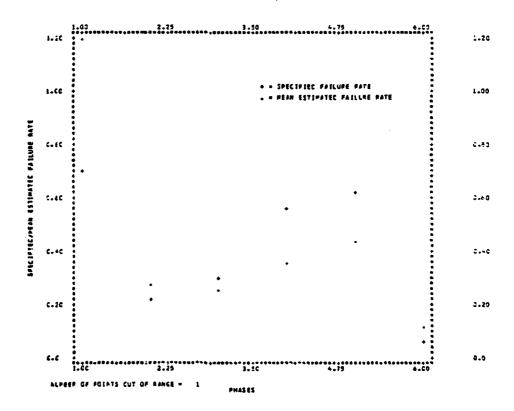
CASE 11

FFASE	1	2	3	•	5	4
ACTUAL FAILURS MATE	6.7000	0.2250	0.3000	0.5500	C-610C	6.2400
FLANAFC SEST TIME	0.2322	0.7223	0.5417	C.2955	C-2464	3.2504
PCCEL ESTIPATE	1.5355	0.3774	0.4103	C.4614	0.5680	0.1254
ESTIMATE ERACR AS PERCENTICE OF ACTUAL FAILURE PATE	119.34	47.73	36.78	16.11	4.58	151.23
SAPPLE STC CENTATION	1.8078	0.3559	0.5967	C.3514	¢.3702	0.0536
CLPSLATIVE TEST TIPE	2.152	8.799	13.760	16.489	18.876	48.642
CLPLLATINE PAILURES	1.3800	2.9400	4.5200	6.1000	7.5500	9.4500



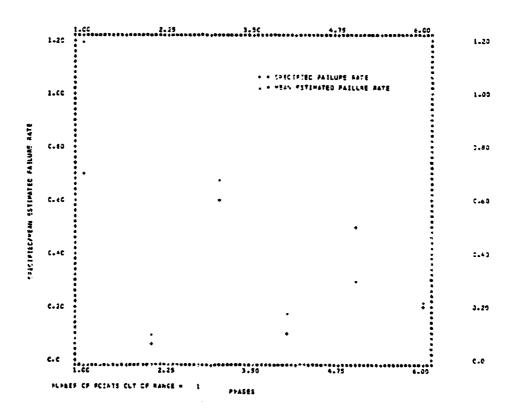
CASE 11 20 ITEPS

1	. 2	3	4	5	•
6.7000	0.2250	C.3400	¢.5500	C-6100	0.0500
0.2322	0.7223	0.5417	C-2955	C.2664	3.2504
1.2623	0.2759	0.2441	C-3507	C.4363	0.1140
80.33	22.41	11.94	34.24	28.47	127.58
1.1929	0.1555	0.1284	C-1534	C.1742	0.0371
4.305	LT-622	27.723	33.145	38-013	\$7.852
2.9960	5.9503	8.8200	11.9700	15.3400	18.3460
	0.2322 1.2623 80.33 1.1929	C.7000 0.2250 0.2322 0.7223 1.2623 0.2759 80.33 22.61 1.1929 0.1555	C.7000 0.2250 C.3000 0.2322 0.7223 0.5417 1.2623 0.2759 0.2641 80.33 22.61 11.96 1.1929 0.1555 0.1286	C.7000 0.2250 C.3000 C.5500 0.2322 0.7223 0.5417 C.2955 1.2623 0.2759 0.2641 C.3507 80.33 22.61 11.94 36.24 1.1929 0.1555 0.1284 C.1534	C.7000 0.2250 C.3003 C.5500 C.6100 0.2322 0.7223 0.5417 C.2955 C.2664 1.2623 0.2759 0.2641 C.3507 C.4363 80.33 22.61 11.96 36.24 28.47 1.1929 0.1555 0.1284 C.1534 C.1742 4.305 17.622 27.723 23.165 28.013



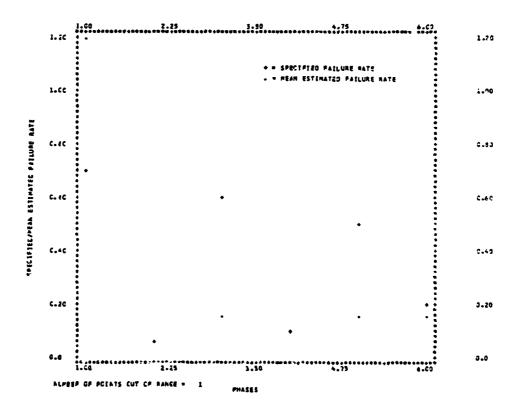
CASE 12 5 1/6/5

PPASE	1	2	3	4	5	4
ACTUAL FAILURE RATE	C.7C06	0.0500	0.6000	C-1000	C.5000	0.2000
PLANNEC TEST TIPE	0-2322	3-2564	C-2709	1-6252	C.3250	0.8124
*CCEL EST: MATE	2.6735	0-1642	0.6812	C-1809	C.3008	0.2121
ESTIMATE EARCH AS PERCENTIGE OF ACTUAL FAILURE HATE	241.93	108.45	13.54	60.67	35.65	6.64
SAMPLE STC DEVIATION	4.1245	0.1413	1.5503	4.1921	0.5044	0.1924
CUPLLATIVE TEST TIPE	1.671	15.454	17.191	24.740	26.225	30.031
CLPLLATIVE FAILURES	0.6300	1.4600	2.3600	3.1000	3.8700	4.4700



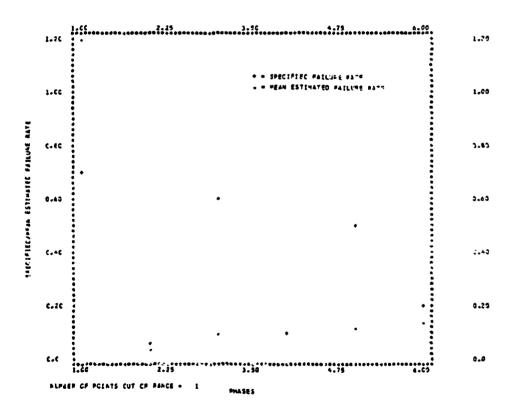
CASE 12

PFASE		2	3	•	5	4
ACTUAL FAILURE RATE	0.7000	0.0500	0.6007	6.1000	C.5000	0.2000
FLANKEC TEST TIPE	0.2322	3.2904	0.2709	1.6252	C-3520	0.4126
PCCEL ESTIMATE	4.7415	0.0432	0.1653	C.1080	C.1534	9.1602
ETTIMATE ERROR AS PEACENTAGE OF ACTUAL FEILURE ALTE	577.36	26.50	72 -46	8.0L	69.28	14.45
SAPPLE STC CEVIATION	24.3199	0.0410	0.2469	C.0750	C.1179	0.1070
CLPLLATIVE TEST TIPE	2.130	32.160	34.663	49.618	52.022	66.420
CLPLLATIVE FAILURES	1.4300	2.9300	4.4630	5.8600	7.3600	8.7660



CASE 12 20 1754

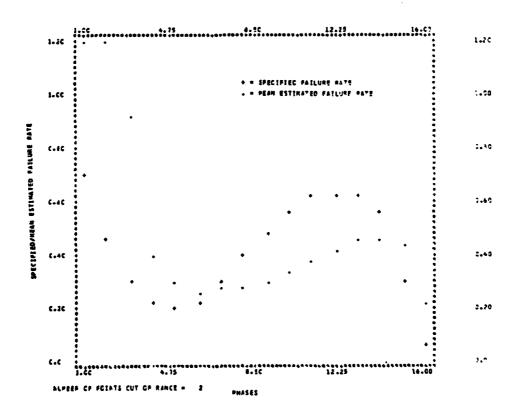
	1 2 3	4	5	•
LLRE RATE 0.7COO	E RATE 0.7000 0.0500 0.6307	C-10CC	C.5006	0.2000
EST TIPE 0.2322	TIPE 0.2322 3.2504 0.2709	1.6252	6.3250	0.8124
IMATE 1.3544	TE 1.3544 0.0467 0.0941	0.0913	0.1258	0.1419
ERACR AS 43.49 CF AGTUAL TE	CA AS 93.49 6.63 84.31	8.74	74.83	24.03
CEVIATION 1.5888	VIATICN 1.5888 0.0296 0.0513	6-0424	0.0535	0.0410
TEST TIPE 4-248	ST TIME 4.248 64.625 69.629	99.672	105.672	120.634
FAILURES 3-27CC	TLURES 3.27CC 6.1100 9.0400	12-1300	15.0400	18.0700
FAILURES 3-27CC	TLURES 3.27CC 6.1100 9.0400	12-1300	15.0400	1



CASE 13 5 17885

1	5	3	4	•	4	7	
0.7000	0.4960	0.3000	C.2250	C.2300	0.2250	3.3000	6.4000
0.2322	0.3412	0.5417	C.7223	C.8124	0.7222	0.5417	C.4C63
2.1455	1.2515	0.9266	0.4025	C.3071	0.2429	0.2761	2.2785
269.34	187.10	238.88	78.69	52.55	16.63	7,58	70.76
1.7129	1.2175	2.3761	0.3381	(.7777	0.1625	3.1523	3.1695
1.084	2.74	5.213	8.521	17.284	15.437	16.126	29.05e
C.5500	1300	2.2100	1.0500	3.7900	4.:000	5.26(0	5.6755
	0.7000 0.2322 2.14:5 2C9.34 1.7129	0.7000 0.4500 0.2322 0.3412 2.1455 1.2515 209.34 187.10 1.7129 1.2175	0.7000 0.4900 0.3000 0.2322 0.3612 0.5417 2.1695 1.2616 0.9266 209.34 187.10 238.68 1.7129 1.2175 2.3761 1.034 2.747 5.213	0.7000 0.4900 0.3000 C.2290 0.2322 0.3412 0.5417 C.7223 2.1495 1.2515 0.9246 3.4025 2C5.34 187.10 238.28 78.49 1.7129 1.2175 2.3761 0.3381 1.084 2.747 5.213 8.921	0.7000 0.4500 0.3000 C.2250 C.2300 0.2322 0.3412 0.5417 C.7223 C.6126 2.1455 1.2616 0.6246 3.4025 C.3071 269.34 187.10 238.28 78.69 52.55 1.7129 1.2175 2.3761 0.3381 C.7777	0.7000 0.4900 0.3000 C.2250 C.2300 0.2250 0.2322 0.3612 0.5417 C.7223 C.6124 0.7222 2.1655 1.2619 0.9266 3.4025 C.3071 0.2429 2C9.34 187.10 238.68 78.69 52.55 16.63 1.7129 1.2175 2.3761 0.3361 C.7777 0.1625 1.034 2.747 5.213 8.521 17.264 15.627	0.7000 0.4900 0.3000 C.2250 C.2300 0.2250 3.3000 0.2322 0.3412 0.5417 C.7223 C.8126 0.7222 0.5417 2.1695 1.2616 0.9266 3.4025 C.3071 0.2629 0.2761 269.36 187.10 238.68 78.89 52.55 16.63 7.66 1.7129 1.2175 2.3761 0.3381 C.7777 0.1625 3.1523 1.034 2.747 5.213 8.521 17.284 15.637 16.126

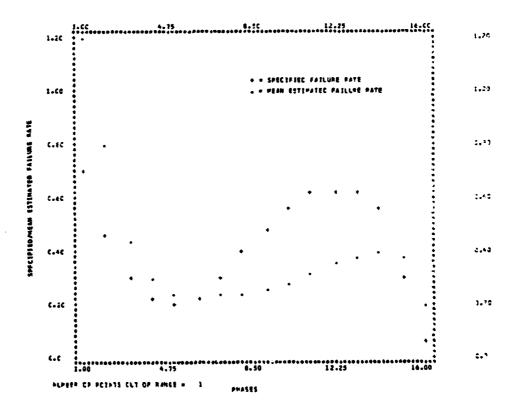
..... 10 11 12 13 14 15 16 ACTUAL PATLURE MATE 0.4750 0.0500 3.55C3 0.6130 0.6250 C-6100 0.5560 0.3000 0.2555 C-260C C-2464 0.2555 C.5417 MICEL ESTIMATE 0.4767 3.2276 0.2543 3.3387 0.3631 C-4242 C.4534 0.4666 PRICEPTAGE TATACTULE 37.62 SAPPLE STO CEVENTION C.1403 0.2024 0.2233 C.2458 C.316C 0.2342 0.2118 C. C539 CLMULATIVE TEST TIME 21.665 23.010 24.225 25.423 26.634 27.556 30.517 11,3100 CUPILLATINE PAILURES 6.4700 7.3000 8.1400 8.9600 4.7600 10.6100 12.1030



CASE 13 LO ITEPS

PPASE	1	2	3	•	5	•	7	•
SCTUSE PERLURE RATE	0.7000	3.4500	3.3630	C.2250	(.2339	9.2250	0.3700	0.4856
FLARAGE TEST TIPE	0.2322	0.3612	0.5417	C.7223	C.0120	0.7222	0.5417	C-4C63
MCCEL ESTIMATE	2.0712	0.1055	0.4441	C.3C11	C.2488	0.2240	2.2335	0.2442
ESTIMATE ERROR AS PENCENTAGE OF ACTUAL PAINUES RATE	155.45	75.00	44.71	33.84	24.39	2.45	22.19	36.95
SAMPLE STC CEVENTICY	2.4201	0.9441	0-3452	C.1534	C.1689	9.0966	0.1015	0.0943
CLULLATIVE TEST TIPE	2.114	5-444	13.457	17-114	24-621	31.244	34.271	40-172
CUPLLATIVE FAILGRES	1.5620	3.2466	4.0000	e.1837	7.1400	5.1100	10.4900	11.7500

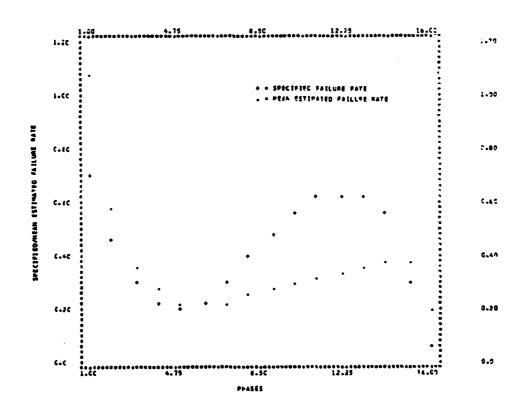
Pr4 58 10 11 12 13 14 15 lé 0.5500 SCTUSE PAILLNE SATE 0.0500 Q.475C C.6250 0.3000 0.6103 C.6100 0.5500 PLANNED TEST TIME 0.3421 3.2555 0-2064 C.2630 C-2464 0.2955 0.5417 3.7574 PCCEL ESTIMATE 0.2633 C.3502 C.2770 0.2565 0.3986 0.1591 C.2631 0.3187 ESTIMATE BRACK ACTUAL 44.61 48.45 47.75 43.97 34.20 27.55 29.52 258.61 SAPPLE STC SEVIATION 0.1052 0.1199 C-1297 C.1384 1.0568 0.1144 C.1458 0.1446 CLPLLATINE TEST TIPE 43.361 46.123 48.581 10.967 53.426 54.146 el.Cee 61.346 CUPULATIVE FAILURES 13.0 500 14.3860 14.3103 17-4000 14.1460 2G.63C0 22.2300



CASE 13 20 ITEMS

PP415	1	2	3	•	5	•	7	•
ACTUAL FAILLRE PATE	0.7636	0.4500	0.3000	C.2250	(.2000	0.2256	C.33330	7.433?
SHIT TEST DRAMAN	0.2322	0.3412	0.5417	0.7223	C.6!24	0.7223	0.5417	0.4067
MCCEL ESTIMATE	1.0814	0.5749	0.3574	C.2743	C.2243	0.2144	C.2286	C.2*35
MATTHATE EFACE AS PERCENTACE OF ACTUAL FAILURE MATE	54.48	27.75	19-15	21.93	12.13	4.70	23.19	37.2€
SEPPLE STE DEVIATION	0.3251	0.3507	0.1542	C.1361	C.C731	0.6767	0.0803	0.0810
CL=LLATIVE TEST TI>E	4.285	10.555	\$1.019	34.271	49.284	42.670	72.571	#7 . 227
CUPULATINE FAILURES	3.0100	5.5564	8-8703	12.0200	19.6168	18.0003	21.1700	24.2390

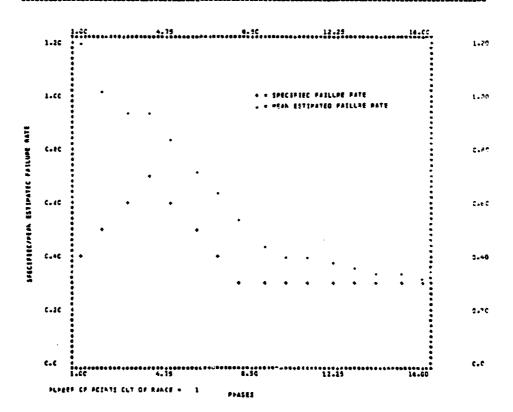
PF# 55 9 10 11 12 13 14 15 16 ACTUAL PAILURE RATE 2.4750 0.5500 0.6100 C-6?50 2.6163 G.55CQ 0.0430 PLANED TEST TEME 0.3421 3.2555 0.2955 3.2534 0.2664 C-200C 3.5417 C.2064 PCOBL ESTIMATE C.2736 0.2985 0.3251 C.3494 C.3697 9.2453 0.3794 9. 2014 ESTIMATE SPACE AS AS RESCRICTURE PARTY OF ACTUAL 42.41 45.72 46.71 44.1C 35.39 29.23 26.48 0.0907 0.6874 SAMPLE STE CEVIATION 0.0855 0.0813 0.0387 3.5677 C.3921 C.09G6 26.320 91.794 111.557 121.655 162.120 CLMULATIVE TEST TIPE 96.751 101.574 106.504 CLPULATIVE PAILURES 27.1300 33.0400 25.9700 30-0603 16.8100 41.5000 45.1200 47.5500



CASE 14 S LTEPS

P>45E	1	2	3	4	5	•	7	•
ACTUAL PAILLINE NATE	C.+CG6	0.5000	9.600)	C.7000	C.econ	0.1100	C.4000	0.7010
PLANAEC 1EST TEPE	0.4643	0.3250	0.2709	G.2322	C.2705	C.3250	G.40e3	G. 5417
MCCEL ESTIMATE	1.2017	1.0294	0.7442	C. 943 8	C.8370	0.1277	0.6429	7. *? *?
ESTIMATE SINCE AS AS DERCEATING OF ACTUAL PRICES FATE	200.44	105.43	57.71	34.83	34.50	45.54	40.72	75.05
SAMPLE STC CEVIATION	0.8453	1.0244	3.9428	C-0915	C.4107	0.4419	0.3950	3.3277
CUPLESTIVE TEST TIME	1.501	3,414	4.675	5.754	7.014	6.522	16.345	17.478
CLALLATIVE PAILLARS	C.6300	1.3353	2.0768	2.8192	3.1400	4.11 CG	5.0100	5.8000

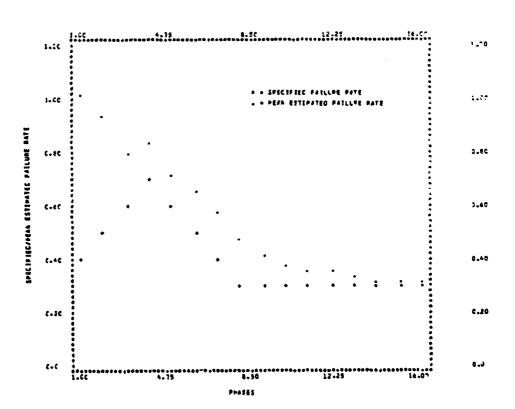
\$+45 5	4	10	11	12	13	14	15	14
ACTUAL PAILURE RATE	C-3CCC	0.3600	0.3000	C.3000	C.3000	0.3000	C.3000	0.3000
PLANAEC 1887 TIPE	0.5417	0.5417	0.5417	G.5417	C.5417	0.5417	0.5417	3.5417
MCDEL ESTIMATE	C.4457	0.4634	0.3945	C.375:	C.3512	0.3369	0.3312	0.3197
ESTIDATE EFFCE AS PERCEPTAGE OF ACTUAL PAILLES BATE	48.54	34,47	31.52	25.0?	17.50	12.30	10.40	6.57
PAPELE STE GEVIATION	0.2358	0.2051	0.1558	C.1731	0-1414	0.1304	0.1265	7.1188
CUPULATINE TEST TIME	:5.418	17.515	20.376	27.857	25.381	27.685	30.354	52.511
CLPLIATIVE FAILURES	é. 443G	7.1 TC0	e.ascc	8.8100	5.4e0C	10.1466	15-5160	11.5700



CASE 14

Phase	1	2	3	4	5	•	7	•
ACTUAL FAILURE RATE	C.4898	0.5000	0.6000	6.7000	C.400C	0.5000	0.4666	c.2:90
PLANNEC TEST TIPE	0.4043	0.3750	0.2709	C-5355	C-2709	0.3256	C.4663	6.5417
PCGEL ESTIMATE	1.0249	0.6324	0.7954	0.8210	C.71.CC	6.6945	J.574L	7.4804
GTTIMATE ERRCE AS SENCENTACE OF ACTUAL FILLES ATE	150-23	84.57	32.57	18.71	14.33	20.91	43.41	60.1"
SAPALE STC CEVIATION	1.1611	0.0713	0.4451	C.4529	C.3486	0.3:73	0.2776	0.0007
CLPCLATINE TEST FIRE	3.744	4.722	9.225	11.342	12.907	14.516	20.062	25.665
CLACESTIVE FAILURES	1.5500	2.2:00	4.7686	4.350C	7.5403	8.9466	10.4000	:1.4236

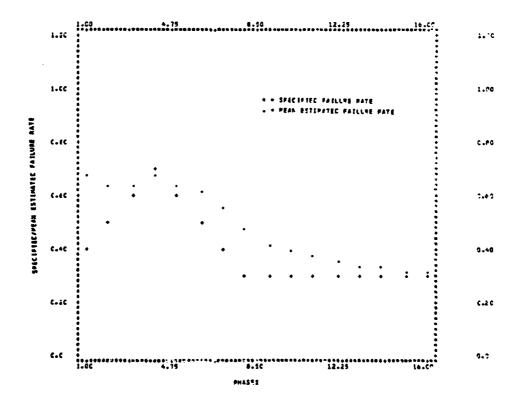
fr455	9	10	11	12	13	:4	7.5	٠٤
ACTUAL FAILUPE MATE	C.3CC0	3.3000	C.3 CCC	1.3000	2326.3	0.3000	5.2003	0.3070
PLANNEC TEST TIPE	0.5417	0.5417	0.5417	6.5417	C.5417	0.3417	2.5417	0.5417
ACCET SELLMALE	0.4192	3.3746	0.3629	C.3511	C.3335	. C. 2275	0.3236	C.3170
FFACEP AGE CF ACTUAL FAILURE MATE	39.74	24.87	20.54	17.03	11-17	5.16	7.85	5.43
SAPPLE STO CEVIATION	0.1591	0.1346	0.1224	C-1043	C.C947	0.0657	3.0848	0.66.4
CLPLLATIVE TEST TIPE	30.701	35.752	40.712	45.666	50.700	55.066	66.678	45.482
CLPLLATIVE FAILLAES	13.3500	14.6760	16.3000	17.5020	15.7100	26.41CC	8394.55	72.5800



CASE 14 20 ITEPS

FPA :E	1	2	3	•	5	4	,	•
ACTUAL PAILLRE SATE	C.4COC	0.5000	3200	C. 7000	0.6000	0.5000	C,4C00	0.3110
PLANNEC TEST TIPE	0.4063	0.3250	0.2709	0.2372	C.77G5	0.3250	0.4763	0.5417
PCGEL ESTIMATE	0.4444	0.6447	0.6330	C.67) 1	0.6484	0.4114	0.5565	0,4782
ESTIMATE ERRCR AS PERCENTAGE OF ACTUAL PASSURE BATE	71.45	28.93	5.49	.4-13	8.04	22.25	35.23	54.25
SAPPLE STO DEVIATION	0.5258	0.4113	0.2714	C-2612	C.2510	0.1863	C.1641	9.1256
CLPLLATIVE TEST TIPE	7.471	13.447	10.470	22.792	27.421	32.614	41.254	51.174
CLPLLATIVE FAILURES	3.1300	6.2100	9.0700	11.8200	14.5800	17.4400	20.9200	24.1:66

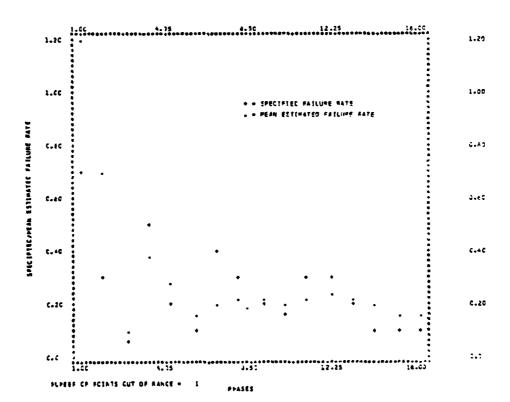
PHASE	•	10	11	12	13	14	15	' 6
ACTUAL FAILURE RATE	c.3ccc	0.3000	0.3000	C.3000	6.7360	2336.2	0.3000	6.7576
PLANNEC TEST TEME	3.5417	0.5417	0.5417	C-5417	6.5417	0.5417	0.5417	C.5417
PCCEL ESTIMATE	3.4262	0.3918	0.3765	C.3522	C.3414	0.3?12	C.3224	C. 314C
FETTHETE FEET AS PETCENTAGE OF AGTUEL PAILUPE HATE	42.68	30.61	23.50	17.41	13.61	16.15	7.45	5.37
SAMPLE STE CEVIATION	0.1045	0.0525	0.06-5	C-0719	0.0086	0.641	0.36?7	0. Ce 51
CLPLLATIVE TEST TIPE	41.120	71.108	41.071	\$1.CBC	101.011	110.472	120.575	130.555
CLPLLATIVE FAILLRES	27.1500	30.1500	33.2400	36.1800	25.27ec	42.2CGG	45.1300	48.0500



CASE 15 5 :TE:S

P>455	1	2	3	•	5	•	1	•
ACTUAL FAILURE RATE	0.7030	0.3000	0.0:07	C-5000	C . 200 0	C-1 CC0	0.4000	0. 3000
PLANACE TEST TIPE	0.2322	0.5417	3.2504	C.3250	C.5124	1.4252	0.4043	0.9417
PCGEL ESTEPATE	43.2422	0.4472	0.1078	C-3765	0.2858	0-1435	0-1510	G-2181
ESTIMATE FRACE AS PERCENTAGE OF ACTUAL PASILIFE BATE	6077.45	132.40	115.52	24.71	42.89	43.54	12.26	27.31
SAMPLE STC CEVIATION	******	0.6149	0.110	C.7281	C.3788	0-1745	0.1773	0.7230
CLPCCATIVE TEST TIPE	1.674	3.573	10.481	15.590	23.722	31.225	33.112	35.575
CLPLLATIVE FAILURES	0.7500	1.9200	2.250G	2.9500	3.7600	4.5200	5.1400	5.4300

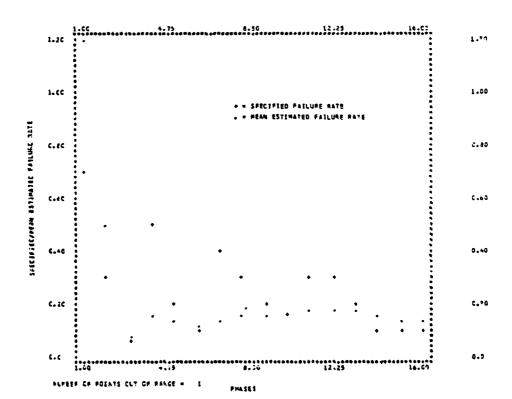
PHASE	•	10	11	12	13	14	15	16
ACTUAL PATLURE SATE	6-2600	0.1500	0.3000	6.3000	C.2000	0-1000	0.1000	0.1000
PLATAGE TEST TIPE	0.8126	1.0435	0.5417	C-5417	C.#126	1.6252	1.6252	1.6252
PCCEL ESTIMATE	0.2127	0.2011	0.2206	C-2304	4.2295	0.1959	0.1686	0.1518
ESTIPATE ERRCH AS RENCENTAGE OF ACTUAL PAILL RE BATE	4.35	34.08	26.39	23-19	14.76	15.68	48.59	51.63
SAMPLE STE DEVIATION	0.1944	0.1587	0.1713	C-1584	0.1455	0.1124	0.0865	C.C777
CLPCLATIVE TEST TIPE	39.351	44.268	46.786	49.254	53.005	6C.484	46.057	75.729
CLPULATIVE FAILURES	6.6500	7.5000	8.3100	4.1700	\$.5cac	10.7100	11.3500	11.5500



CASE 15

PPASE	ı	2	3	4	5	•	7	
ACTUAL PATEURE RATE	0.7686	0.3000	9.0590	0.5000	C. 2000	0.1000	C A 000	0.3000
PLANNEC TEST TIPE	0.2355	0.5417	3.2594	6.3750	G.8124	1.4752	C.4G6?	0.:417
PCCEL ESTIMATE	1.4414	0.4541	0.0789	0.1567	C-1444	0.1105	0-1365	0.1541
ESTIMATE ERROR AS RESCENTACE OF ACTUAL PRILLIPE RATE	137.34	44.68	57 -84	68.67	27-61	10.47	65.36	48.65
SAPPLE STE CEVIATION	1.4267	0.5024	0.1076	C.3366	C.1544	0.0636	0.0857	0.3777
CLPLLATIVE TEST TIPE	2-104	7.(63	37.101	40-105	47.656	42.576	\$4.304	71.262
CLPCLATIVE FAILURES	1.7700	3.3500	4.8900	6.3500	7.9200	9.36C0	10.9830	12.5500

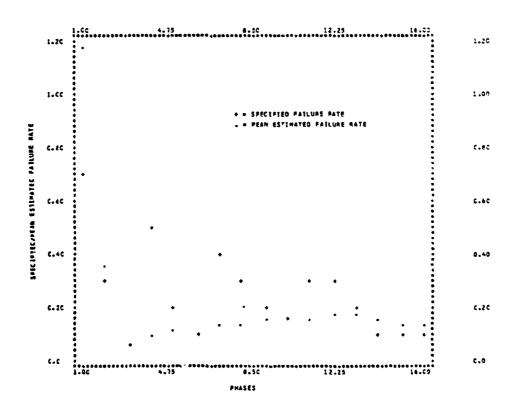
13 15 14 P+45E 10 11 12 14 0.1600 ACTUAL FAILURE RATE C-2000 0.1500 Q.3 CQC 6.3000 C.2CGC C.1000 0.1000 PLANNED TEST TIPE 1.0835 0.5417 C.5417 C-4126 1.4252 0.8126 3.1742 0-1622 C. 1411 C.1828 0.1499 MCDEL ESTEMATE 0.1600 0.1580 C-1838 SETTMATE CARCE AS MERCENTISE OF LCTUAL MAILURE BATE 45.85 41.12 19.98 9.31 41.54 38.74 8.60 e2,15 SAPPLE STE CEVEATION 0.0293 0.0838 0.2939 C.0620 0.6822 D.Cee7 0.0547 0.0579 151.152 53.707 134.257 CUMULATIVE TEST TIPE 76.788 88.725 58.702 104.248 121.305 CLPLLATIVE FAILURES 13.9500 15.5700 17-1400 LE.44CG 20.1100 21.4400 23.2900 24.6700



CASE 15 20 TIEFS

P+45E	1	2	3	•	5	•	7	•
ACTUAL FAILURE MATE	0.7630	0.3660	0.0500	6.5000	C.2000	0.1500	0.4000	0.3000
PLANNEC TEST TIPE	0.2322	0.5417	3.2504	C.3250	C.8126	1.6252	0.4063	0.9417
PCOEL ESTIMATE	1.1826	0.3503	0.0400	C.0928	6.1123	0.1635	0.1308	0.1530
PERCENTAGE OF ACTUAL FAILURE HATE	48.98	16.77	19.92	81.45	43.65	7.46	67.20	50.0
SEMPLE STE GEVIATION	1.3276	0.1547	0.0254	C-0401	0-0442	0.0357	0.6493	0.0519
CUPLLATIVE TEST TIPE	4.272	14.248	74.066	60.098	45.C34	124-911	132.346	142.278
CLPLLATIVE FAILURES	2.9900	5.8500	9.3000	11.7600	14.2800	18.0500	21.3200	24.4500

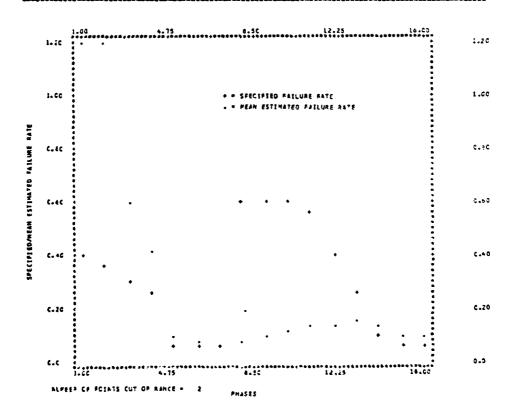
P+45E	9	10	11	12	13	14	15	16
ACTUAL PAILURE RATE	0.2000	0.1500	0.3000	6.3000	C-2000	0.1000	0.1000	0.1000
PLANNEC TEST TIPE	0.8126	1.0425	0.5417	C.5417	C-812e	1.4252	1.6752	1.6252
MCDEL ESTEMATE	0.1560	0.1532	0.1658	C.1800	C-1817	0.14?1	0.1479	0.1378
ESTIMATE ERROR AS BERCENTAGE OF ACTUAL PAILUFE TATE	22.01	2.10	44.73	40.31	4.15	63.13	47.65	37.75
SAMPLE STC CEVIATION	0-0518	9.0465	0.0486	C.04ú3	0.2456	0.0410	0.0332	0.0301
CLPLLATIVE TEST TIPE	157.243	177.242	187.247	157.196	212.194	242.173	272.258	302.306
CLPLLATIVE FAILURES	27.4000	30.4300	33.4100	36.6600	15.618C	42.6600	45.4900	48.4300



CASE 14

PHASE	1	2	3	•	5	4	7	•
ACTUAL PAILURE RATE	6.4000	0.3500	0.3000	C-2500	(.0500	0.0500	0.0550	c.eccc
PLANNET TEST TIME	0.4663	0.4443	0.5417	C.6501	3.2504	3.2504	3.2504	0.2709
PCOEL ESTIPATE	2-2716	2.3319	0.5924	0.4192	C. 1 C90	0.0749	C.C596	0.0749
ETTIMATE ERRCR AS BERGENTAGE OF ACTUAL FAILUSE SATE	467.91	546.25	97.46	67.66	118.06	44.76	19.25	87.52
SAPPLE STC GEVIATION	4.7638	12.3516	0.5611	0.2692	C.C689	0.0458	0.0371	0.0420
CUPULATIVE TEST TIPE	1.878	3.569	6.457	9.450	24.581	39.528	54.650	55.695
CLHILATIVE FAILURES	0066.3	1.4700	2.3600	3.1900	3-9200	4.4500	5.4300	6.1700

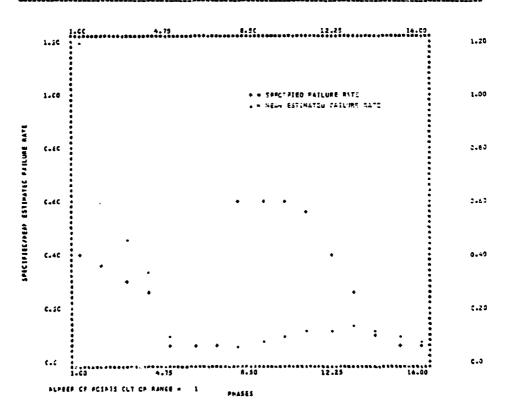
P+415	9	16	11	12	13	14	15	16
ACTUAL FAILURE RATE	C.6000	0.6000	J.5500	C-4000	C-25GQ	0.1000	0.0500	0.0100
FLANNET TEST TIME	C.27C9	0.2709	0.2955	C.4063	C-6501	1.4252	3.2504	3.2504
MCCEL ESTIMATE	C.3507	0.1168	0.1339	C-1486	C.1601	. 0.1440	0.1057	3.0410
ETTIMATE EAROR AS PERCENTACE OF ACTUAL PAILLHE MATE	84.89	60.53	75.65	02.46	35.97	42.55	119.36	a1.99
SAMPLE STC CEVIATION	0.0534	0.0828	0-0629	\$ -0892	C-C994	0.0793	0.0512	0.2463
CLHLLATIVE TEST TIPE	57.150	58. ±70	59.730	61.603	¢4.563	72.116	87.265	102.556
CLPLLATINE PAILURES	4.8500	7.7763	8.5000	5.2360	10.0100	10.4900	11.3100	11.5300



CASE 14 10 STEAS

PFASE	1	2	3	4	5	•	7	•
ACTUAL FAILURE RATE	0.4000	0.3500	0.3000	C.2500	c.0500	0.0500	0.0500	0.4000
FLANNEC TEST TIPE	0.4063	0.4643	0.5417	C.4501	3.2504	3.2504	3.2504	C.2704
PCCEL ESTIMATE	1.3927	0.6009	0.4457	C.3459	C-1024	0.0667	0.0523	0.0645
ESTIMATE EARDA AS PERCENTAGE OF ACTUAL FAILURE SATE	248-14	71-69	55.24	34.35	104.46	11.44	4.44	85.24
SAPPLE STC CENTATION	2.2082	0.4355	0.2504	C.1796	0.0450	0.0263	0.0124	0.0246
CLPLLATIVE TEST TIPE	3.724	7.987	12.941	18.954	44.688	78.729	108.916	111.465
CLHLLATIVE FAILLRES	1.6400	3.2700	4.9400	4.4400	#.C500	9.4600	10.7766	12.1100

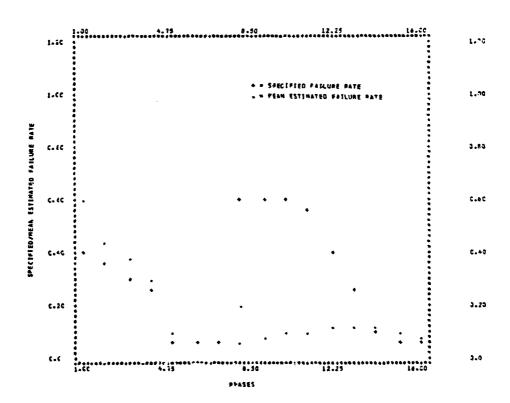
P+4 5E	9	10	11	12	13	14	15	16
ACTUAL FAILURE RATE	0.6000	0.6000	8.5500	C.4000	C.250C	g.1cco	0.0502	0.0500
FLAPSEC TEST TIPE	0.2709	0.2709	0.2555	0.4063	C-65C1	1.6252	3.2504	3.250
MCGEL ESTIMATE	0.0791	3.0560	0.1133	C.1264	0.1347	0.1246	0.1011	G. C & 7 C
ESTIMATE EARCE AS PERCENTAGE OF ACTUAL PAILURE WATE	86 - 81	84.00	79.40	66.41	46.12	24.64	162.18	73.55
SAPPLE STG GEVIATION	0-0286	0.0357	0.0409	0.0431	C. C438	0.0364	0.0263	0.0220
CLULLATIVE TEST TIME	1:3.966	116.459	119.164	122.893	128.903	144.121	173.911	203.009
CL-LLATIVE FAILURES	13.6500	15.2600	16.8700	14.3700	19.8300	21.1000	22.6703	24.1600



CASE 16 20 :16:3

1	2	3	•	5	4	7	
6-4000	0.3560	0.3000	C-2500	C.0500	0.0500	0.6560	7.600
0.4063	0.4643	0.5417	C-6501	3.2504	3.2504	1.2504	C. 2705
0.5997	0.4452	0.3736	C.3396	6.0908	0.6618	0.0506	0.6637
49.92	27.19	24.54	23.82	81.51	23.42	1.15	89.38
0.4130	0.2385	Q.1584	C.1179	C-C314	0.0163	3-0146	0.0176
7.498	16.057	26.036	38.054	58.276	158.310	214.639	223.662
3.0000	4.1ecc	9.3600	12.3800	15.1960	18.1500	20.9666	23.5360
	0.4063 0.5597 49.92 0.4130	C.4000 0.3500 0.4063 0.4643 0.5597 0.4452 49.92 27.16 0.4130 0.2285	C.4000 0.3500 0.3000 0.4063 0.4643 0.5417 0.5557 0.4452 0.3736 49.92 27.19 24.54 0.4130 0.2325 0.1584 7.498 16.C57 26.036	C.4000 0.3500 0.3000 C.2500 0.4063 0.4643 0.5417 C.6501 0.5577 0.4452 0.3734 C.3394 49.92 27.15 24.54 23.32 0.4130 0.2225 0.1584 C.1179 7.498 16.C57 26.036 38.054	C.4000 0.3500 0.3000 C.2500 C.0500 0.4063 0.4643 0.5417 C.6501 3.2504 0.5557 0.4452 0.3736 C.3396 G.0908 49.92 27.15 24.54 23.82 81.91 0.4130 0.2285 0.1584 C.1179 C.C316 7.498 16.C57 26.036 38.054 58.276	C.4000 0.3500 0.3000 C.2500 C.0500 0.05CC 0.4063 0.4643 0.5417 C.6501 2.2504 3.2504 0.5597 0.4452 0.3736 C.3396 0.0908 0.6618 49.92 27.15 24.54 23.82 81.91 23.22 0.4130 0.2325 0.1584 C.1179 C.C314 0.C183 7.498 16.C57 26.036 38.054 58.274 158.310	C.4000 0.3500 0.3000 C.2500 C.0500 0.05CC 0.05C0 0.4069 0.4643 0.5417 C.6501 2.2504 3.2504 3.2504 3.2504 0.5597 0.4452 0.3736 C.3396 0.0908 0.Ce18 0.05C6 49.92 27.19 24.54 23.32 81.51 23.22 1.16 0.4130 0.2285 0.1584 C.1179 C.C316 0.C183 3.0146 7.498 16.C57 26.036 38.054 58.276 158.310 218.639

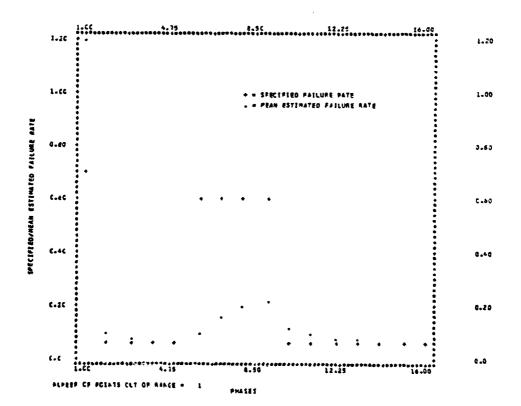
PHASE 10 11 12 13 14 1: 16 ACTUAL PATLURE RATE 0.4000 0-6007 C-5500 C.4000 0-2500 C.1666 0.0500 0.0500 PLANNES TEST TIPE C-2709 0.2769 0.2955 C.4063 3.2504 3.2504 C-65G1 1.6252 PCCEL ESTIMATE G-3767 0.0905 0.1044 C.1189 G.1190 0.0964 0.0840 C-1266 ESTIMATE SARCE AS BERCENTAGE OF ACTUAL PAILLYE BATE 87.21 84.52 40.66 10.26 45.36 18.58 43.57 47.52 SAMPLE STE CEVIATION 0.0260 9.0209 0.0193 0.0218 0.0254 C.0276 C-0297 C.CL68 233.716 346.552 CUPULATIVE TEST TIPE 758.832 408.775 224.499 234.165 246.73? 285.011 CUPLLATIVE FAILURES 29.5100 25.5200 26.2660 41.0500 43,4100 -6.9900 20.7100 32.6700



CASE 17 S 17EHS

PPASE	1	2	3	4	5	•	7	•
ACTUAL FAILURE RATE	C.7000	0.0900	0.0500	6.0500	£.C506	0.6000	0.6000	0.6000
FLANKEE TEST TIPE	0.2322	3-2504	3.2504	1.2564	3.2504	0.2709	C.27C9	0.2704
MCCEL ESTIMATE	3.1219	0.1044	0.0767	¢.0553	0.0540	0.1088	0.1417	6-5655
ESTIMATE ERROR AS PERCEPTACE OF ACTUAL FAILURE SATE	345.54	109.20	53 .34	10.54	7.96	81.87	72.25	66-64
SAPPLE STC CEVEATION	4.3345	0-1278	0.1014	0.0348	C-C371	9.1726	9.3576	C.4368
CLPLLATIVE TEST TIPE	1.074	16.100	31.132	46.144	61-049	62.342	43.584	64.847
CLPLLATINE FAILURES	4.7300	1.4500	2.4600	3.1000	3.5800	4.7500	3.56CC	6.23CC

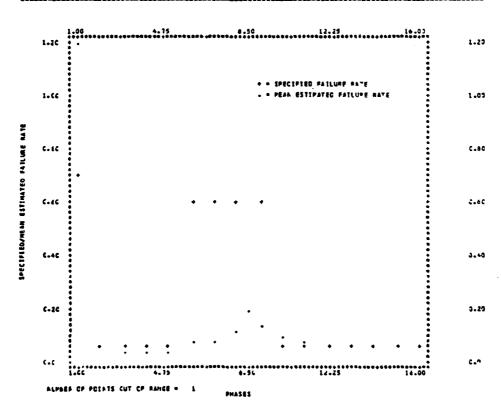
FF45E	5	10	11	12	13	14	15	lé
ACTUAL FAILURE RATE	C-6CCC	0-0500	0.0500	C.050C	C.0500	0.0500	0.0500	0.0500
PLAPREC TEST TIPE	6.2765	3.2504	3.2504	1.2504	3.2504	3.2504	3.2504	3.2504
PCGEL ESTEMATE	0.2253	0-1140	0.3539	C.0803	0.0722	0.0690	0.0672	0.0632
ESTIMATE ERROR AS PERCENTAGE OF ACTUAL PAILUPE PATE	62.44	128.68	87.77	40.54	44.43	27.51	34.27	24.31
SAMPLE STC DEVIATION	0.4564	0.0759	9.0561	0.3404	C. C328	0.0311	G.C297	0.0256
CLPLLATIVE TEST TIPE	44.090	01.203	95.926	110.912	125.809	140.723	155.584	179.701
CLPLLATIVE FAILURES	7.0100	7-7100	0.5400	5.2300	10-0300	10.8300	11.7400	12.4900



CASE 17

PFASE	1	3	3	•		•	7	•
ACTUAL FAILURE RATE	6.7000	0.0500	0.0500	C.0500	C.0500	0.4000	C.6000	0.6003
PLANAGE 1251 11PE	0-2322	3.2504	3.2504	3.2504	3.2504	C.2709	0.2709	C.27C4
PCCFL ESTIPATE	1.816C	0.0566	0.3405	C.0444	C.0445	0.0707	0.0657	0.1162
PSTIPATE ERPCH AS REACENTAGE OF ACTUAL PAILURE BATE	159.43	13-12	14.CI	11.24	11.00	66.21	85.04	20.44
SAMPLE STC CEVIATION	3.5101	0.0560	0.0252	0.0368	0.0333	0.0540	0.1254	0.1591
CLPLLATINE TEST TIPE	2-147	32.677	42.841	52.878	122.973	125.450	128.010	130.535
CLPLLATIVE FAILURES	1.4200	2.6500	+-1 2 G G	5.6300	7.140C	0.2500	5.8700	11.1500

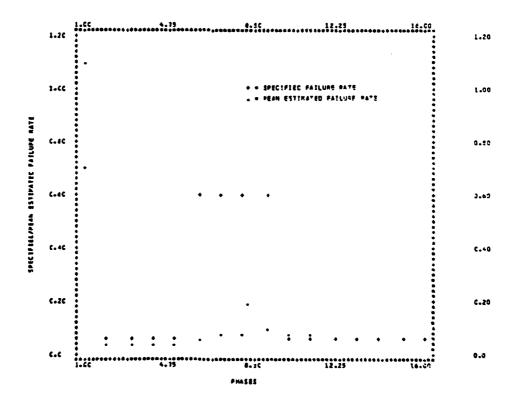
P+45\$	•	10		12	13	14	ls	14
ACTUAL FAILURE RATE	0.6000	0.0503	0.0500	C.0500	C.0500	0.0500	0.0500	c.c500
FLANNEC TEST TIPE	0.2709	3.2904	3.2504	3.2504	3.2504	3.2504	3.2504	3.2504
PCGEL ESTIMATE	0.1420	0.0533	0.0742	C.0692	C.C651	0.0609	0.0575	0.0553
ESTIMATE ERRCA AS RERCENTAGE OF ACTUAL PAILUPE MATE	76.34	86.68	56.50	38.39	20.14	21.75	15.73	10.00
SAMPLE STC CEVIATION	0.2162	0.0514	0.0361	C.0275	0.0237	0.0220	3.0199	0.0144
CUPLLATIVE TEST TIPE	133-023	163.146	193.266	223.406	253.301	282.464	312.431	343.632
CLPLLATIVE FAILURES	12.7400	14.2100	15.5500	17.0100	18.64GG	19.9900	21.4200	22. 8200



CASE 17

PPASE	l.	2	3	•	5	•	7	•
ACTUAL PARLUPE PATE	0.7000	0.0:00	0.0100	C.0500	C.C50C	0.4660	C.4666	C.eCOC
FLARNEC TEST TIPE	0.2322	3.2504	3.2504	3.2504	3.2504	C.27C9	0.2709	C. 2704
PCGEL ESTIMATE	1.0535	0.0495	0.0396	C.C379	C.C373	0.0533	C.07CS	0.0016
ESTIMATE ERRCR AS PERCENTAGE OF ACTUAL PAILLES PATE	54.27	C.58	20.45	24.12	25.47	91-12	£6-15	£5.23
SAPELE STC CEVEATION	1.0963	0.0273	0.0214	C.0162	0.0144	9.0231	C.C3C4	0.0272
CLULLATIVE TEST TIPE	4.301	64.276	124.450	184.981	245.142	250.144	259.140	262.155
CLPLLATIVE PAILURES	2.9200	6.0200	8.8500	11.0100	14.7000	17.7500	20.7900	23.6766

PFASE 10 11 12 13 14 15 16 SCTUAL PAILURE RATE 0.0:00 0.0500 0.0500 0.0500 C.6030 3.0500 C.050C C.C500 PLANKED TEST TIPE C.2769 3.2:64 3.2504 1.2504 1.2:04 3.2564 3.2504 3.2994 PCCEL ESTIPATE 0.1050 0.0648 0.0591 0.0571 G. C550 0.0755 G.9682 C.C637 STIPATE STRUCK ALLES STRUCK ALLES STRUCK ALLES STRUCK STRU 82.36 10.07 73.63 50.98 36.43 27.31 14.26 14.11 SAMPLE STE CEVIATION 0.0413 0.0298 0.0232 C. CL 94 C-0164 9.0144 0.0134 3.3123 CLPLLATIVE TEST TIME 265.205 485.722 325.C17 385.302 445.457 505.314 565.518 625.528 CLPLLATIVE FAILURES 24.3 500 29.4800 32.5000 35.4700 28.5400 41.2500 44.3600 47.3300

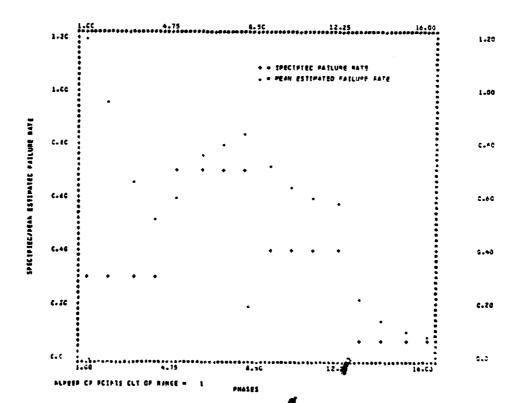


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CASE 18

P+15E	l .	2	3	•	5	4	7	6
ACTUAL FAILUPE MATE	0.3000	0.3000	0.3000	C.3000	6.7666	0.1CC0	0.7000	C. 7CCC
PLANNEC 1EST TIPE	0.5417	0.5417	0.5417	6.5417	C-2322	0.2322	C.2322	0.2222
PCCEL ESTEMATE	1.6200	0.9481	0.6453	0.5246	C.405A	0.7648	0.7508	0.8333
ESTIMATE ERROR AS RERCENTACE OF ACTUAL FALLURE RATE	564.47	222-49	121 -78	74-86	13.45	\$. 26	12.67	15.04
SAPPLE STE CEVIATION	4.7804	2.3516	0.7554	C.5059	C-6297	0.6660	0.5736	0.4053
CUPULATIVE TEST TIPE	2.505	5.042	7.507	10.020	11-114	12-158	13.223	14.268
CLPLLATIVE FAILURES	0.7100	1.4200	2.2400	2.9400	3.5000	4.4768	5.3700	4.1030

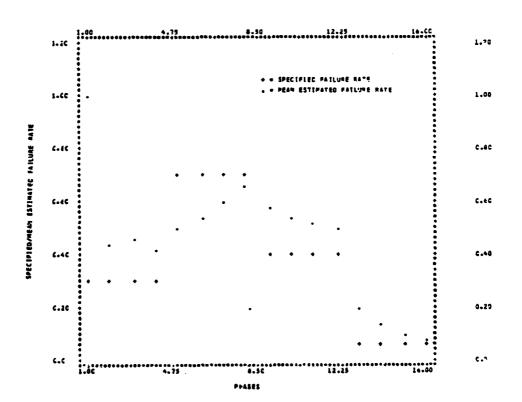
PF3 { E	•	10	11	12	13	14	15	16
ACTUAL PAILURE RATE	C-4C00	0.4000	0.4000	C.4000	C.C500	0.0300	0.0500	0.0500
SLANASC TEST TIME	0.4043	0.4663	0.4043	C.4063	3.2504	3.2504	3.2504	3.2574
MCCEL ESTEMATE	0.7238	0.6428	0.5941	0.5712	0.2266	0.1403	0.1027	0.0841
ESTIMATĂ ERRER AS PERCENTAGE CF ACTUAL FAILUFE BATE	60.94	60.69	46.51	42.79	1:1.20	150.41	105.42	68.26
SAPPLE STC DEVIATION	0.5225	0.3726	0-3149	0.298?	(-0908	0.0445	0.0350	G-C530
CLHLLATIVE TEST TIME	14.166	14.057	19.541	21.604	36.765	51-970	67.164	82.335
CLPLLATINE FAILURES	4.820C	7.5300	8.2700	5.0700	1.1200	10.4000	11.2500	11.5100



CASE 14

PPASE	1	2	3	•	5	6	7	4
ACTUAL FAILURE RATE	C.3CGC	0.3000	0.3000	C-3000	C.7000	0 . 10 CC	0.7000	0.7000
S417 FEBF DS48614	G.5417	0.5417	0.5417	6.5417	C.7322	G.7322	0.2727	0-2322
PCGEL ESTIPATE	0.9924	0.4254	0.4509	6.4141	6.4922	0.5417	0.4050	0.6507
ESTIMATE SARCE AS BENCENTACE OF ACTUAL FAILURE PATE	230-81	45-14	50.31	30.03	29.49	22.61	13.57	7.65
SAPPLE STC GEVIATION	1-8064	0.3275	0.3510	C-2213	C-2894	0.3006	0.3487	0.3093
CLPLLATINE TEST TIPE	4.927	9.532	14-858	19.747	21.909	24.C61,	26.213	28.341
CLPLLATIVE PAILURES	1.7500	3.0400	4.7600	4.5600	7.5706	9.32CG	10,8400	12.4700

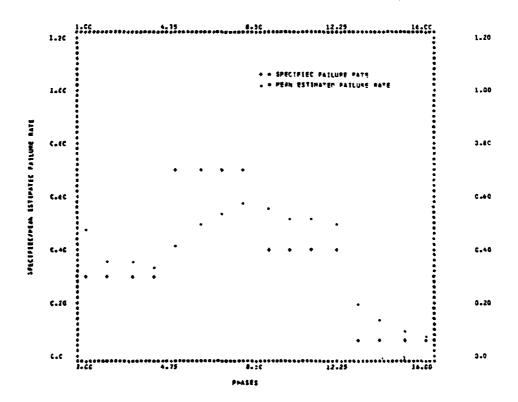
Prast	•	10	11	12	13	14	11	16
ACTUAL FAILURE RATE	C-4C08	0.4680	0.4000	C-400C	C.0500	0.0500	0.0500	0.0500
FLANNEC TEST TIPE	0.4063	0.4063	0.4063	C-4063	3.2504	3.2504	1.2564	3.2504
PCGEL ESTEMATE	0.5856	0.5325	0.5184	C.5015	C-2063	. 0.1226	0.1004	0. (829
ESTIMATE ERROR AS PERCENTAGE OF ACTUAL PAILUPE MATE	46.41	33-12	29-41	25.34	312.54	145.13	100.70	65.73
SIMPLE STE CEVIATION	3-2372	0.1869	0-1458	C-1604	C.C580	0.0421	0.0282	0.0230
CLPLLATIVE TEST TIPE	32.125	35. i50	39.705	43.459	73.410	103.734	133.755	163.586
CUPLLATIVE FAILURES	13-8200	15.0400	16-5500	14.0700	15 -480,0	20.8400	22.3300	23.2700



CASE 18 20 : Teps

P+411	1	5	3	•	5	•	7	•
ACTUAL PAILURE RATE	G-3 COC	0.3000	0.3300	6.3000	C.1000	6.7666	C.70C0	0.7000
PLANNE TEST TIPE	0.5417	0.5417	0.5417	6.5417	6-2322	0.2322	G-2322	6.2122
PCCEL ESTIMATE	0.4793	0.3448	0.3657	C.3373	C,4107	0.4905	0.5454	0. :000
ESTIMATE ERRCH AS BERCENTAGE OF ACTUAL PAILLEE MATE	59.77	22.28	21.89	12.43	41.32	25.68	22.00	le.CI
SAPPLE STC CEVIATION	0.4000	0.2244	0.1727	C-1377	C.1405	0.1751	0.1789	0.1504
CLPLLITIVE TEST TIPE	5.576	19.586	29.490	35.508	44.206	46.475	52.744	57.035
CUPULATIVE FAILURES	3.0300	5.5000	4.1800	12.0400	14.4466	18.1200	21.0300	23.5500

**** 10 11 12 13 15 14 SCTUSE PATELLAG RATE C.4CG5 0.4000 0.4000 C.4000 C.C500 0.0:00 0.0560 0.6500 FLANDEC TEST TIPE 0.4063 0.4663 C.4063 0.4663 2.2504 3.2564 3.2504 3.2504 PCDEL ESTEPATE C.5038 0.552C 0.5296 0.5202 G.2070 0.1310 0.1365 0.0825 BETTINITE BERCE AS BERCENTIGE CF ACTUAL FALLIFE PATE 38.01 32.40 25.95 SAMPLE STO CEVIATION 0.1544 0.1516 3.1315 C.1207 0.0237 C. C139 0.0415 0.0184 CUBLLATIVE TEST TIPE 64.545 72.CS1 79.547 21.097 147.563 208.236 267-736 327.023 CUPLLATIVE FAILURES 16.0300 41.5466 26.9100 29.8460 33.1100 18.87CC 44.6266 47.5000



APPENDIX B

Results of Test 2

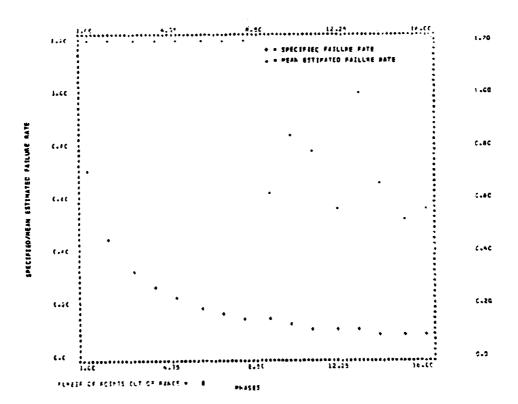
This appendix contains the results for Cases 1, 3, 7, and 18. The planned test times were generated for a probability of survival of .99.

A detailed description of the format of the results can be found in Appendix A.

CASE 1 SITEMS

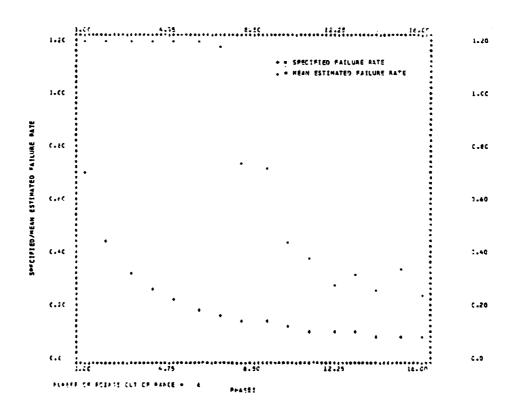
F>41E	1	2	3	•	1	4	1	
ACTEAL PATELINE SATE	C.7CiC	0.4340	G.3200	(.2550	C.2120	6.1f3C	C.161C	0.1446
FEARPEC 1551 TEPE	C-0143	0.0332	0.0314	6.0194	C+C472	0.0:49	0.044	C.Cese
PCCEL ESTIPATE	31.0263	16.3034	5.3556	2.7270	3.6902	2.4186	1.2357	1.3403
### #### #### ########################	4433.54	3454.11	1546.13	1341.57	1417.71	1221.60	667.57	844.63
SEPPLE STC CENTATION	26.7155	18.4636	1.32(5	3.9890	1.1768	4.1512	1.2041	1.165
CLALLATINE TEST TIME	0.071	0.167	0.243	Ç.535	C-774	1.045	1.755	1.707
CLECESTINE FAILLERS	0.0306	0.0400	E.6566	(.1300	6.1866	C.21CC	C.2!CC	C.24CC

F+4:E	\$	10	11	12	13	14	1!	16
ACTUAL FAILLEE RATE	G.1336	3.1180	0.1050	C.1010	C.C536	0.(676	0.0823	C. C776
PLANNET TEST TIPE	C.075e	0.0645	C.C522	C-C595	C-1674 ·	C-1147	G-1221	0.1255
PCC81 6577P2*5	C.6253	J. 8411	0.7862	C.5501	C.99G3	G-6564	0.5116	0.5547
ETTIPATE EFFTA AT REPCEPTACE OF ACTUAL	273.15	612.81	95.459	444.63	117.56	645.32	\$11.42	614.86
SAPPLE STE CENTATION	0.5297	1.6848	1.2175	(.7225	1.9628	1.4664	1.3351	C. 5517
CLAFFE 1821 1:46	:.CE:	2.513	2.969	7.466	4.(61	4.272	1-162	5.626
CLPLLATINE FAILLFES	C.2500	0.3303	0.3666	(.3600	8.4200	C.47CC	C.4800	C. ! 2CC



FPASE	1	5	3	•	•	ŧ	1	•
SCILAL FAILLEE PAIE	C.7C2G	0.4240	0.3201	C.2550	C.213C	0.1630	C.161C	Q. 144C
FLAPPEC TEST TEPE	0.0143	C.C232	0.0314	C.C354	C.C412	0.0:47	0.0024	C.Cese
PCCEL ESTIMATE	16.3215	3.6730	2.7172	1.4535	1.2089	1.3854	1.1616	0.7745
PATILISE SATE	2226.45	780.64	749.14	470.19	992.66	4:7.CE	624+03	410.07
SAPPLE STC CENTATION	17-4622	7.6113	3.3150	1.7987	2.2216	2.5653	2.5256	1.4261
CUPULATINE TEST TIPE	0.142	2.373	0.485	1.076	1.548	2.054	2.714	3.411
CLPLLATINE FAILLRES	C.110C	0.2100	C-3200	C.3700	C.47CC	C.4CCC	C.44CC	C.17CC

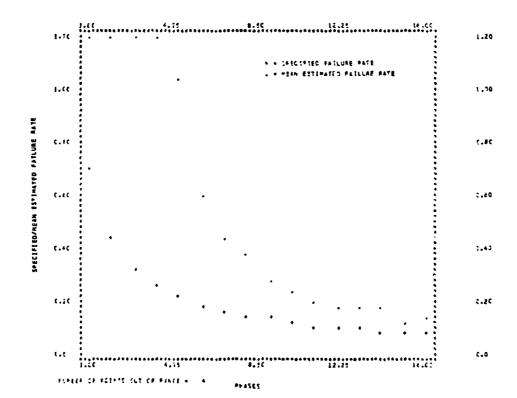
10 14 15 11 12 13 ié C-132C 0.1160 C.1050 FLEPPEC 1651 11+E C.C756 0.0857 0.0522 C.0995 C.1014 · C.1147 PECEL ESTEMATE C.71C5 0.4429 0.3654 (.2846 C.3194 C.2536 C.3424 ESTINATE SPACE ASTUAL SEPPLE STE CEVIATION C.2:35 C-6555 C.2998 C.1723 C.4563 1.2661 0.4564 CLPLLATINE TEST TIPE 5.926 4.915 7.974 5.119 10.222 0.3400 1.1200 1.2200 1.3600 1.5100 CUPULATINE FAILUFES 1.0300 1.6300 1.7900



CASE 1

****	1	1	3	•	2	ŧ	7	•
ACTUAL PATILIFE FATE	C.7C2C	0.4346	0.3200	6.2550	6.2136	C.1430	0.1610	G.144C
PLAPNET 1E27 TEPE	0.0143	0.0232	2.0314	6.0394	6.0472	6.(146	0.Ce#4	0.(158
PEGEL ESTEMATE	7.3617	4.5436	1.9522	3.0595	1.03#e	0.6045	0.4370	C.37C4
PRILLER FEITS	451.53	1935.05	\$10.66	1655.82	261.60	220.25	111.47	157.76
SAMPLE STE CENTATION	11-2572	9.8559	2.4569	10.5748	2-1166	C.1323	0,4225	C. 7662
CUPLLATINE TEST TIPE	0.285	0.144	1.264	2.149	1.027	4.376	2.417	e. EC 8
CLPLEATINE FAILUPES	C-21CG	3.4100	0.7300	1.6806	-1.3266	1.5466	1.8300	1.5500

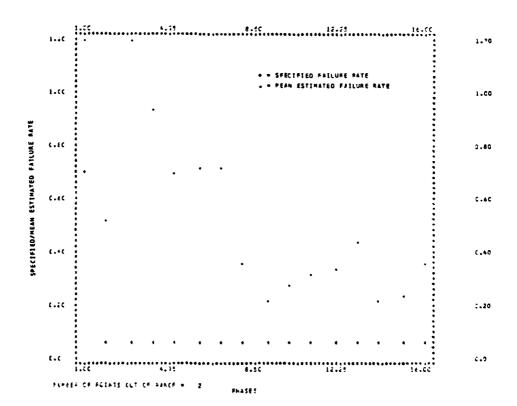
F## !! SCTUSE PASSUER PATE 0.1230 3.116: 2.1093 C.1010 C.C524 C.CETE 0.0823 0.0176 BERNALD TEST TIPE Cacise 0.0632 0.0522 (.(595 C-1074 ' C-1147 0.1221 C. 1255 -----PECEL ESTEMATE C - 2 £ 4 2 0.2035 C.1782 C-17C7 0.1773 0.1241 C.1215 0.2334 ESTIMATE ESPISE AS ESPISE AS ACTUAL FAILURE FAIL 112.71 97.61 £7.C7 74.48 €2.36 162.25 20.75 65.44 0.4362 6.6531 C. 1771 CUPULATINE TEST TIPE 8.212 10.006 CLPALATINE FAILLRES 2.1800 2.4200 2.5800 2.7700 3.0100 3.1800 2.3500 3.6200



CASE 3

49458	1	2	3	•	5	ŧ	,	ŧ
267626 FF1665 PA78	C.7CCC	0.6:00	0.0507	C.050C	C.C5C0	0.0500	e.csca	p.c:30
#14PPEC 16:1 TIME	C.3144	0.2616	C.2C10	C-2010	6.5616	C-2C1C	c.25°C	6-16-6
PCCEL ESTIMATE	32.0656	0.5139	1.9666	C.9339	C.7C85	0.7113	C+77.C5	0.3:52
ESTINATE ESSEN ASTUAL FAILURE SATE	4463.65	527.76	3833.15	1767.81	1317.02	1322.65	1341.74	41C.5C
SEPFLE STC CEVIATION	27.0076	0.3126	4.5185	1.4566	1.0875	1.6373	1.1814	CHIRCE
CERCLATIVE TEST TIPE	G.C72	1.675	2.070	3-067	4.068	5.062	e.C61	
CLPLESTIVE PAILLESS	C.05CC	0.6666	C.lecc	C.2300	C.270C	0.3660	G.43CC	C.446C

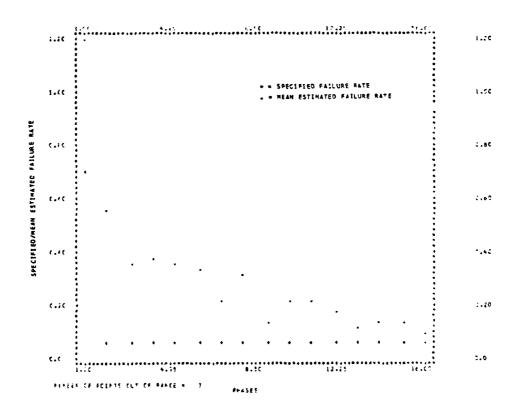
FFEEE	\$	10	11	*2	13	14	1:	1€
ACTUAL PAILURE RATE	0.0500	0.0500	9.0500	C-050G	C.050C	C.C5CC	6.0900	C.C530
FLARREC 1517 TIRE	C.2C1C	0.2010	0.2013	C-2010	C.2C1C		0.2010	C-251C
PCCEL ESTEMATE	C.22C1	0.2776	0.3250	C.3424	C.43G1	0.2221	C.2412	C. 3e3e
ESTIDATE SARCE AS RESCENTAGE OF ACTUAL PAILLIE SATE	340.23	455.10	545.55	184.87	166.12	344.18	382-17	621.22
SEPPLE STE CENTATION	C.1745	9.4573	C.8C21	C-4751	6.8256	G.2CE7	0.1615	C.7554
CUNLLATIVE TEST TIME	6.067	9.048	10.676	11.065	17.068	13.065	14.067	15,070
CUPLLATINE FAILURES	C.47CG	0.1100	C.54CC	(.6408	0.7166	C.15CC	e.75Cc	C. E7CC

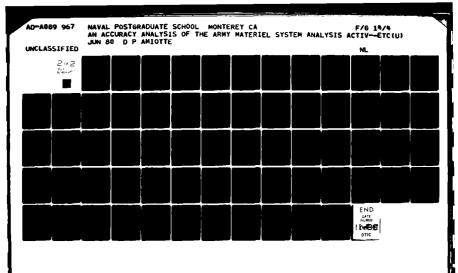


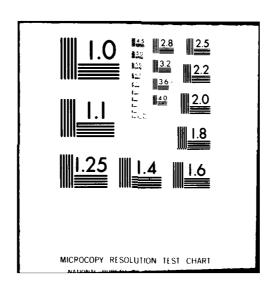
CASE 3

F+458	1	3	3	•	5	۵	7	•
ACTUAL FABLUFE RATE	\$.7666	0.0100	5.3503	C +0500	C.C5CC	C.C.CC	0.0500	Ç. C5C
PLANEC TEST TIME	0.0144	0.2610	c.2C1C	(.2010	C.icic	C.2C1C	0.2010	C-5C1 (
MCCEL ESTIMATE	21.3252	0.5628	0.3142	(.3768	C.3535	0.3435	C.2254	0.1177
ESTINATE EFFCT ASSESSED FOR ASS	2547.31	107:.50	628.43	£53.64	464.92	586.55	3:0.86	534.4
SAPPLE STC CEVIATION	15.1402	1.0362	0.5002	C.5325	C.5064	0 - 4C !Z	C.271C	C. EC7
CUPLLATINE TEST TIPE	0.142	2.142	4.140	6.135	£-134	10.126	12.128	14-121
CIPLESTINE FAILURES	(.1300	9.2209	C.340C	(.4000	C.410C	0.7860	C.44CC	6.1/0/

\$P#16	۶	10	11		13	= -	15	16
ACTUAL FAILURE RATE	0.0500	0.0100	C.0500	C.050C	C.C5CC	0.0500	0.0500	0.0100
SAIT TEST TIME	0.2010	0.2016	0.2616	0-2010	0.7010	C.2C1C	C.7C1C	c.2010
+CGEL ESTE # 278	C.145E	0.2130	0.2107	C.1847	C-1244	6.1321	C.14CC	C. (594
ETTIPATE EPACE LE EFECENTACE CF COTLÂL FAILLES SATE	151.56	325.54	320.48	269.46	146.66	164.15	175.55	56.72
SAPPLE STE CEVIATION	C.1736	0.9655	0.4478	C+5876	C.1471	0-2141	0.2916	0.0595
CLECUTIVE TEST TIFE	16.135	16.132	20.130	22-131	24.125	26.126	28.126	30.127
CLPLLATINE FAILURES	1.0100	1.0500	1.5500	1.3000	1.4400	1.5700	1.6800	1.7e0c



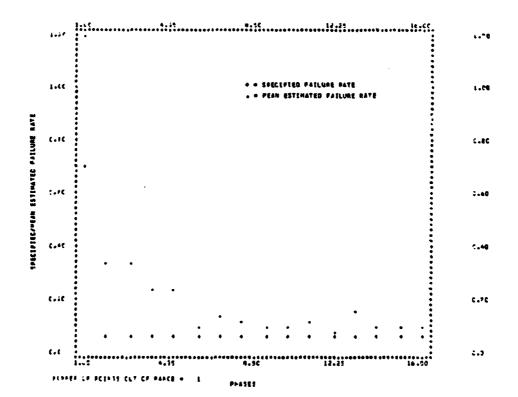




CASF 3

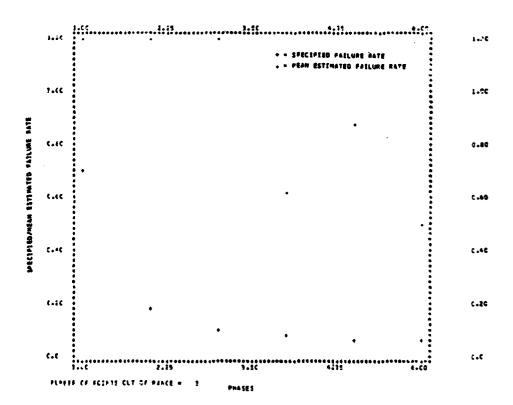
FP411	1	3	3	•	9	4	1	•
1C*L81 FAILL#5 #4*6	C.7666	0.6566	4.0560	C.65CC	(.(566	6.6:66	C.C5CC	Ç.C.OC
FLAPPEC 1627 1695	0.0144	0.2616	6.5676	C.2010	C.2C1C	C-4C1C	C-251C	
+CCEL ESTIPATE	5.4476	0.3441	6.3305	C.2375	C.2337	0.1096	C.1444	C. 1124
FET (B) TICE EFFCS AS	1252.51	266.17	540.49	\$14 . 57.	347.44	111.45	158.80	124.82
SAPELE STE CENTATION	16-6111	0.2155	C.51C7	C.318G	C.7C25	0.1261	0.2652	0.1771
CLPALATINE TEST TIPE	6.264	4. 284	1.265	12.280	14.269	10.252	24.288	28.292
CLPELATINE FAILURES	C.1766	0.4166	C.AICC	(.650C	C.448C	3321.1	3.3866	1.450C

10 11 12 12 14 15 16 ACTUAL FITTLESE RATE C.0:CC 0.0:05 0.0500 C-0500 C.CSCC C.C!CC c.c:cc C. C9CC PLANNEC TEST TIME C.2C1C C.2C1C C.2010 C.201C . C.2C16 C.2C1C C. 2010 9.2C1G C. (556 0.1205 0.0546 PCGEL ESTIPATE C.C884 C.1682 0.1646 C.0545 C. C\$51 50.24 141.01 71.27 226.47 **65.91** 162.66 95.29 SAMPLE STE CENTATION 0.1267 C-1555 C-0974 C.5484 C.1225 C.27EE C. ?C4! C-1150 52.266 CUPLLATINE TEST TIPE 32.254 34.255 40.286 44.255 46.276 54.250 ec.26" 2.1366 3.1600 CUPLLATINE FAILURES 1.4000 2-1100 2.2400 3.4QCC 2.5000 1.8003



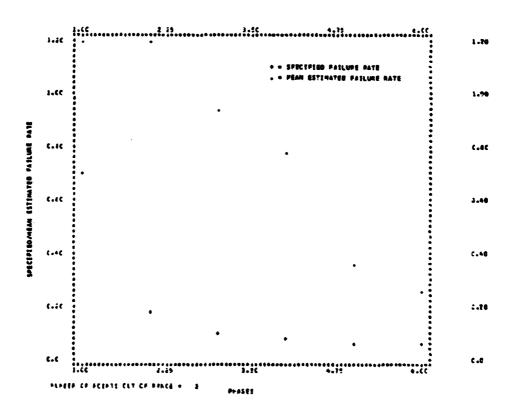
\$ 17895

1	1	3	•		4
6.7666	0.1456	0.1640	C -074C	7.000	8.0:00
0.0144	0.6114	C.654#	C.1322	C.Lers	e.icic
15.8422	4.7837	1.3417	C-4275	C.0015	`6.5009
2734.55	2557.63	1144.58	725.64	1345,14	\$61.74
10.4311	4.5765	1.5446	C.4792	C.555G	0.4631
0.677	0.250	0.622	1-487	2.114	3.316
C.0200	0.0100	0.0106	C-106C	C.140C	3338.3
	0.0144 15.8422 2734.55 1C.4211	0.0144 0.0228 16.8422 4.7837 2734.56 2551.63 10.4211 4.5765 0.072 0.250	0.0144 0.0128 C.0548 15.8422 4.7837 1.3417 2734.55 2523.63 1144.58 10.4213 4.8765 1.5446 0.072 0.250 0.822	0.0144	0.0144 0.0112 C.0546 C.1322 C.1012 15.8422 4.7697 1.3613 C.6279 C.6615 2734.55 2351.62 1164.58 725.64 1264.16 1C.4213 6.5765 1.5446 C.4797 C.555G 0.072 0.250 0.622 1.482 2.216



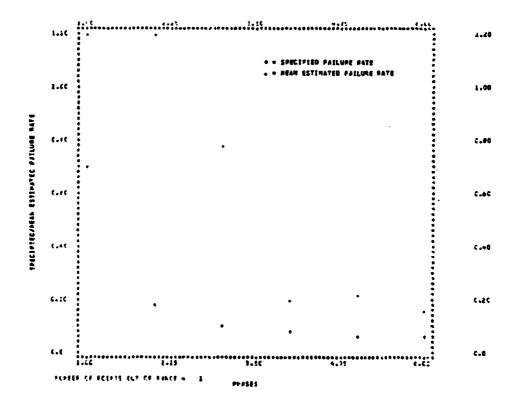
10 T18PS

FF45E	1	ā	1	4	\$	•
40TL4L F41LL#5 #A1E	C. 7666	0.1666	C-1660	0.0760	C.C4CC	0.5900
FC4446E , 1617 T1+6	0.0144	0.0110	0.0448	6.1355	6.1675	4.:(16
PCCEL #111P47E	4.644	1.5263	6.9321	6.7858	(.3577	6.7554
PRINCE CARECTAL PRINCE CARECTAL	766.63	749.64	719.30	433.91	456.22	415.28
SAPELE SIC CENTATION	2.6424	1.6645	1.0482	1.7264	C.5474	0.4262
CLPCLATINE TEST TIPE	Q. 141	C.455	1.442	2.959	4.425 .	4.425
CUPALISTINE FATALIBES	C.010<	0.1700	0.3100	(.3800	C.44CC	0.5400



Cast 1

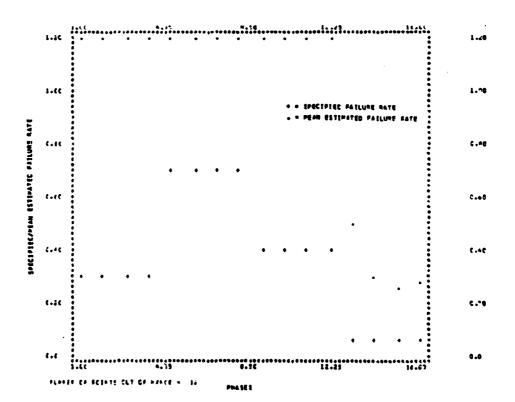
66916	1	5	1	4	•	4
ACTUAL FAILURE SATE	C.7CC8	0.1860	0.1640	C.076C	Ç.C4CC	9.0:00
844846C 1831 1846	6.0144	0.0158	0.0544	C.1355	C.1679	G.2C10
PCCEL #511*ATE	12.0286	1.2754	C.7400	C.2064	C.2261	` C.1574
PRICE IN THE PRICE ACTURE	1622.62	416.75	635.67	131.96	266-20	214.65
SAPPLE STC CENTATION	17.3610	3.0845	1-4882	C.178G	(.1413	C.7557
CLPCLATIVE TEST TIPE	6.244	1.359	3.262	3.516	1.225	13.257
Check#71vE ##144##1	C.170C	0.3350	0.5760	6.720C	0.8500	1.6766
********				*******		



CASE 10

91421	1	2	3	•	•	ŧ	1	•
ACTUAL FAILURE RATE	7336.7	0.3000	6.3660	C.300C	C.70GE	0.iccc	6.7909	0.700 6
\$144466 1621 12+6	0.0119	0.6115	0.0115	C.0372	6.6144	6.6144	6.6144	È.6144
*CEEL E17:>47E	15.2334	4.5075	10.1454	4.9844	4.222	5.4412	3,7474	4.6147
PRINCIPLE TRACTOR	4577.83	2261.17	3208-53	1141.55	631.78	445.32	411.14	261.61
SAPPLE STE CENTATION	12.4522	4.5145	16.3445	6.4999	14.3163	12.5001	4,3179	4.4762
CLPLL #11/4 1897 #1#6	0.144	0.233	0.495	Q.444	C.737	C.669	C.661	C.452
CLPCLATINE FAILLERS	8.04CC	3323.	0.200	C.2500	.C.278C	6.2466	6,3100	6.4166

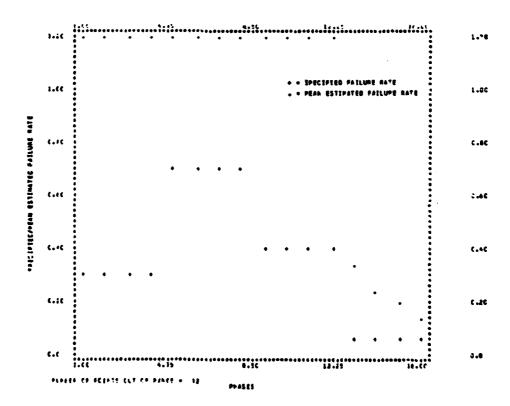
Frail	•	10	11	15	· 13	14	!5	**
4CTL#L F#ILL## #ATE	C.4CQC	J.4CCC	8.4GE8	C.4CBC	(.0500	8.0306	0.0500	C.C300
PLAPPEC TEST TEPE	C-9251	0.0291	0.0251	C-0251	6.4616	6.4516	6.5616	6. 1614
P:C8L 8511-4-8	4.5:54	3.1593	3.3609	4.1636	C - 9 Q 5 7	0.3561	C.2615	C. ;71e
Parity of the Pa	1638.90	411.63	729.22	54C.91	\$11.34	451.52	425.72	443.25
Sepece STE CEVIATION	4-4262	4.2546	4.6341	4.3504	C.1004	C-4215	c.3555	0.44?1
CUPULATINE TEST TIME	1.077	1. ;0;	1.327	1.452	2.455	1.414	4.458	5.459
CLPLLATINE FAILURES	C.446G	0.4566	6.9666	C-439C	C-44C6	C-41CC	C.72GG	8.7100



CASE 18

*****	ı	1	3	•	•	ŧ	7	•
ACTUAL PAILLER BATE	C.3CCC	0.3666	C.3CQG	C.3000	C.706C	0.1CCG	0. 76CC	e.1666
#L4944C 1EST TIPE	6.3335	0.0115	0.0335	(.0335	6.6144	C.C:44	C.6144	Ć-C144
*CCEL E:71>47E	7.4158	4.3144	4.7355	1-2234	1.5167	2.4967	2.7:25	2.4650
Hilling Chil	2439.13	2074.43	1478.51	441-14	455.45	367.18	267.70	252.14
SAPELE STE CEVIATION	4.4515	9.6550	7.3254	1.0223	4-4445	3.2014	5.0178	2.7750
CL+LLATINE 1811 11+8	0.111	C-444	0.555	1.331	1.474	1.617	1.746	1.463
CLALLATIVE FAILLAGE	C-12CC	0.2760	¢.3468	C.530C	C-460C	0.1766	C.4166	c.4376
			*********		******			*******

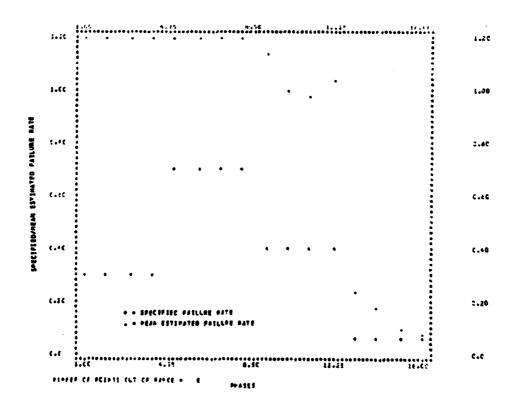
10 11 12 . 12 14 15 14 ACTUAL PATLLIE BATE C.4CC0 0.4666 C.CECC 0.4000 6.4030 6.6566 C.C5CG PLANEE 1557 TIPE 0.0:11 C.G251 C-2CIC 0.0251 C.0251 C.201C . C.acic C-251C STATIFE LESSE 2.4416 2.3661 2.2541 1.5479 C.3427 6.2422 0.2055 C-1765 497.Ci 510.35 443.52 266.95 181.16 344.25 335.88 176.54 5.2161 STREET STE ERVERTICA 5.5CCE 1.0868 2.501 5 C.lece 6.3:30 C.2444 C.:447 CLPLISTING TEST TIPE 2.153 2.463 2.45? 4.503 6.559 2.903 4.566 1.7766 CAPALITINE FRILLRES 1.3200 1.1100 1.2400 1.3300 1.1506 1.1ecc 1.45CC



CASE 18

1	1	3	•	5	4	7	
6.366	0.3666	6.3666	C.3904	C.70GC	9.3066	6.7566	Ç.7666
2:46.3	0.0235	0.0335	C.0335	C.C144	6.0144	6.6144	C. C144
2.5621	1.5091	1.8567	1.3944	1.!216	2.72!1	1.5564	1.7649
1067-50	539.02	119.55	164.86	341.05	262.30	126.04	143.51
4.7221	2.1145	2.3244	1-6115	1.3355	7.9045	2.0274	2.4663
C-444	1-124	3-ccc	2.066	2.532	3.227	2.523	3.495
0.1500	0.3966	C-61CG	C.48CC	1.0300	1.2500	1.44GC	1.6200
	C.JCCC C.JJ55 2.5621 1C67-5C 6.7221	C.ACCC 0.3CCC C.0335 0.0235 3.5627 1.5C51 1C67-5C 939.C2 6.7221 2.1145 C.466 1.224	C.3CCC 0.3CCC C.3CCC C.0359 0.0995 0.0935 2.3C27 1.5C51 1.8987 1C67-5C 939-C2 919-59 6.7221 2.1145 2.3948 C.446 1.224 2.CCC	C.3CCC 0.3CCC C.3CCC C.3000 C.0355 0.0235 0.0335 C.0355 2.3C27 1.5C21 1.8367 1.3946 1C67-5C 939.C2 519.92 264.66 e.7221 2.3145 2.3948 1.8112 C.466 1.224 2.CCC 2.666	C.3CCC 0.2CCC C.3CCC C.3000 C.70CC C.3359 0.0335 0.0335 C.0339 C.C144 2.3C27 1.5C21 1.8S87 1.3946 2.2216 1CE7-5C 939.C2 919.92 284.86 241.05 6.7221 2.1145 2.3248 1.8112 9.3395 C.666 1.324 2.CCC 2.666 2.532	C.3CCC 0.2CCC C.3CCC C.3000 C.70CC 0.7CCC C.3359 0.0235 0.0235 C.0235 C.C144 6.C144 2.5C27 1.5C51 1.8507 1.3944 2.5274 2.7251 1C67.5C 339.C2 519.55 244.04 241.05 285.3C 6.7221 2.1145 2.3248 1.8112 8.3355 7.5C45 C.444 1.224 2.CCC 2.000 2.592 3.237	C.3CCC 0.3CCC C.3CCC C.300G C.70GC 0.7CCC G.7CCC C.3355 0.0355 0.0335 C.0335 C.0144 6.0144 C.0144 C.

13 C.4CG6 3.4000 0.4000 C.400G C.201C . C.1C10 PCCEL #5119475 1.1466 C. 5557 C.9717 1.0478 C.234C 0.1723 9.1Cte 0.0626 ******************* SAMPLE SIC CENTATION 1.2512 2.2701 C.C7*C C. C:11 1.3000 0.5164 C.1467 C.2514 CLPALATINE TEST TIPE 1.164 5.214 CUPLIFTIVE PAILURES 1.8CCC 2.6465 2.2400 2.400C 1.53CC 2.77CC 2.8400 3.5800



APPENDIX C

Results of Test MOD1

1. Test MOD1

Test MOD1 used the AMSAA model to estimate the failure rate of the items tested except as described below. A more detailed discussion of the molification can be found in Section V-D.

Use of the AMSAA model was modified as follows:

a. The point estimate of the failure rate,

was used whenever cumulative test time over all items was less than 10 hours.

b. The slope of the reliability growth pattern was estimated using the current point estimator, r_p , and the previous estimate, \hat{r}_{i-1} , of the failure rate as follows:

SLOPE =
$$r_D - \hat{r}_{i-1}$$

Increasing slope was then determined from the following relationship:

$$r_p - \hat{r}_{i-1} \geq .07$$
.

If the slope was increasing, the point estimate, r_p , was used as the current estimate of the failure rate. Then, the AMSAA model was reinitialized, that is, time and failures prior to an increasing slope were not considered in future estimates made by the model.

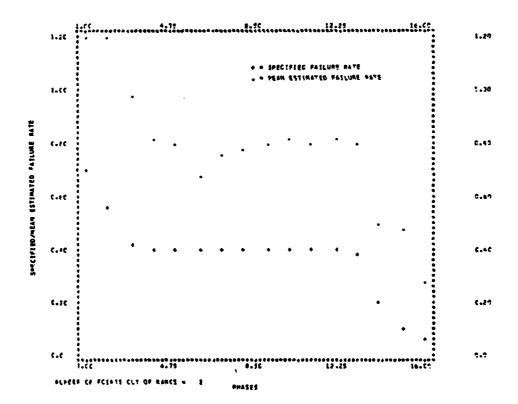
2. The Results

Results for Cases 4, 6, 15, and 18 are presented here as representative of the effect the modifications had on the performance of the model. A detailed description of the format of the results can be found in Appendix A.

CASF 4 5 liters

99458	1	2	3	•	5	•	7	
ACTUAL PAILUPE HATP	0.700	0.5200	0.4250	C.4950	C.4006	Ø.4GE8	9.4000	C.4676
PLANACC TEST TIPE	6.2122	0.2499	C.3424	C.4013	6.4663	6-4643	0.4643	j-46 43
*CCEL ESTEP#TE	1.3450	1.2500	C.9288	C.8159	C-8047	6.4754	0.7687	0,7757
ESTIDATE ERRCE AS PERCENTAGE OF ACTUAL PAILURE FATE	42.15	134.54	132.45	101.47	161.66	45.44	\$2.17	43.43
SAPPLE STE CEVENTICE	0.6725	0.7354	0.6517	C.4587	0.4655	0-2567	0.4922	3. \$40
CLPLLATINE TEST TIPE	1.674	2.410	4.202	6.044	7.942	4.642	11.657	13.560
CLPLLATIVE FAILLMES	C.6400	1.5100	2.0720	2.8900	3.5506	4.1700	4.9260	5.6500

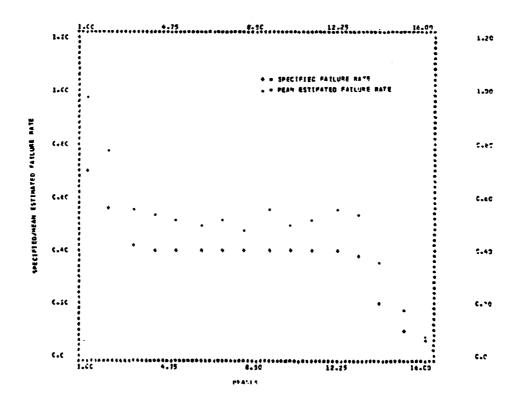
***** 15 11 12 .13 19 14 ACTUAL FAILURE RATE C.4CC0 0.4000 4.4000 C.3750 0.2000 FLANNES TEST TIPE C.4126 0.4663 0.4643 0.4643 C.4C43 6.4334 1.6757 3.7504 #CGEL #\$11##*E 0.0014 3.8147 0.7922 6.4142 C.7501 0.4575 C.4416 0.2#30 BETTIPATE BRACK AS BERCENTAGE CF ACTUAL FAILLE FATE 100.41 193.67 18.05 193.55 112.62 146.76 360.57 445.52 SAPPLE STC CEVIATION 0.4259 1.5376 1.0416 C.5C55 0.4576 0.4452 C.7469 C.7541 CUPLLATIVE TEST TIPE 15.442 17.215 19.146 21.049 22.075 24.860 24.326 45.304 7-1500 7.7800 CLPLLATIVE FAILURES 4.4400 £.2700 9.0800 10.020 10.5400 11.6490



CASE 4 10 STEPS

PASE	1	5	3	4	5	e	7	4
ACTUAL PATILIRE RATE	0.7000	0.5500	0.4250	C.4050	C.400C	C-4666	6.4066	. c.460C
PLANAGE 1857 75#6	0.2322	0.2955	0.3824	C.4013	0.4663	0-4Ce3	0.4663	ċ. 4¢• ±
PCCEL ESTIMATE	9.4735	Q.7741	0.5674	6.5329	C.525#	C - 5926	0.5283	******
PRILLIPE PATE	39.13	41-11	13.50	31.54	31-45	25.45	32.00	15.38
SAPFLE STE CEVIATION	0.6685	0.5434	0.3215	C.3374	C.265e	0.3714	C-2459	C-7567
CLPLLATIVE TEST TIPE	2.136	4.667	4.462	12-133	15.443	15.623	22.410	27.199
CLPCLATIVE FAILURES	1.5400	2.9400	4.1400	1.8000	7.1000	8.4500	16.7000	11.4100

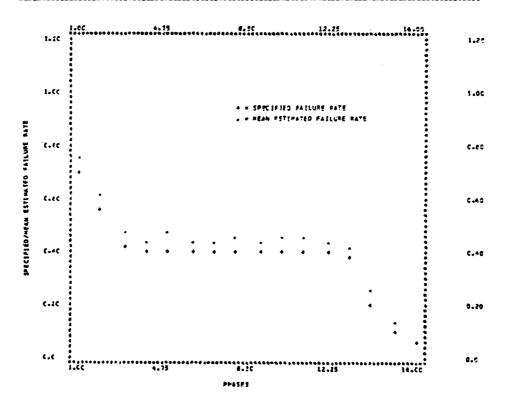
10 11 12 13 15 14 SCYLAL PAILURE RATE C-4C30 0.4000 0.4000 6.4000 0.375C c.zcce 0.0000 PLAPPEC TEST TIPE 0.4663 0.4C63 0.4663 C.4C63 C.4334 0.6126 1 -6252 3.2504 PCCEL ESTIPATE 0.5674 0.4526 4.5256 C.5553 C.5457 0.1559 C.1563 0.0254 ESTIMATE ERRER AS FERCENTAGE OF ACTUAL FAILURE ESTE 41.84 23.15 31.40 10.63 45.53 77.54 £6.25 71.55 SAMPLE STG CEVIATION 0.3480 0.3131 0.3157 0.2990 C.3674 0.2904 C.1443 C. (555 CLPLLATIVE TEST TIPE 30.943 34.723 38.455 42-187 46.176 52.627 48.585 58.201 12.9700 14.4500 14.0100 17.2200 18.6900 20.5400 22.1500 23.5300



CASE 4

Past	1	2	3	4	5	4	1	
#CTL#1 P#7LL#F ##1E	C.7C00	0.5500	0.4250	C.4050	C.400E	6.4666	Ccc3	0.4000
PLAPAEC 1857 TIPE	0-2322	0.2955	0.3624	C.4013	¢.4¢63	0.4063	0.4063	0.4663
PCCEL ESTIPATE	0.7576	0.4155	0.4855	C-4428	C.4775	8.4449	0.4455	0-4675
ESTIPATE ERACE AS SERCENTACE OF ACTUAL FALLUE RATE	8.23	12.63	14.22	9.33	19.39	11.22	11.30	16.98
SAPFLE STC CENTATION	0.4180	0.3464	0.2597	G.2565	(.3132	0.2414	0.2685	C.2144
CLPLESTIVE TEST TIPE	4.213	9.758	16.874	24.303	31.794	35.227	46.759	54-166
CLACLATINE FAILURES	2.9560	5.6868	8.8100	11.7100	14.7166	17.6100	20.6365	29.5500

P+41E	ş	10	11	12	13	14	15	16
SCTUSE PAILUPE BATE	C-4698	0.4000	0.4000	C.4000	C.375G	0.3660	0.1000	0.0500
9417 TEST 33444JF	0.4663	0.4663	0.4663	C.4C63	C.4334	• • • • • • • • • • • • • • • • • • • •	3 -6252	3.2504
PCEEL ESTI>ATE	0.4416	0.4474	0.4527	C.4400	0.4221	6.2574	0.1406	Ç. C669
ESTIPATE FARCE AS BEATERIAGE OF ACTUAL PAILUPE BATE	10.40	16.85	13.17	10.00	12.55	\$6.71	40.83	36.53
SAPPLE STC CENTATION	C.ZCGC	0.2343	0.2373	C.2154	C-2216	0.1574	0.0957	C.C261
CLPLLATIVE TEST TIPE	41-674	69-133	76.672	E4-172	92-154	107-194	137.320	197,432
CLPLLATIVE FAILLAGS	27-0460	30.2266	32.6500	34.1700	15.0600	42.0400	44.8000	47.8500



GASE 6

0.1000	0.7000	******					
	0.1.00	C.7500	¢.7000	6.7666	0.4000	0.4000	c.4ccc
0.2322	0.2382	0.2323	C.2322	C.2322	0.4663	0-4541	Ö. 4C&3
1.3492	1.4414	L.374G	1.4248	1.3626	1.(920	0.5158	C.7451
99.C3	105.51	54.85	103.54	54.44	112.55	129,64	Se.27
0.6434	0.8539	0.7429	C.7812	£-4653	0.3146	C-4374	0.5084
1.061	2.126	3.205	4.305	2.374	7.210	5.075	10.468
C.7420	1-4500	2.2000	2.6406	2.4700	4.1100	4.5766	9. 65CC
	1.3492 95.03 0.6434	1.3492 1.4414 95.C3 105.61 0.6434 0.8539 1.061 2.128 C.7400 1.4600	1.3492 1.4414 L.378G 95.C3 105.51 56.85 0.6434 0.8539 0.7429 1.061 2.128 3.205	1.3492 1.4414 1.3780 1.4248 45.03 105.51 46.85 103.54 0.6434 0.8539 0.7429 C.7812 1.061 2.128 3.205 4.305 C.7400 1.4600 2.2000 2.6400	1.3492 1.4414 L.3780 1.4246 1.3928 95.03 105.51 66.85 103.54 94.68 0.6434 0.8539 0.7429 C.7812 C.6553 1.061 2.128 3.205 4.305 2.374 C.7400 1.4600 2.2000 2.8400 2.4700	1.3492 1.4414 L.378G 1.4248 1.3628 1.6920 95.03 105.61 96.85 103.54 94.68 172.99 0.6434 0.8539 0.7429 C.7812 C.6653 G.3256 1.061 2.128 3.205 4.305 2.374 7.210 C.7400 1.4600 2.2000 2.6400 2.4700 4.3200	1.3432 1.4414 1.3780 1.4248 1.3628 1.6920 0.9198 95.03 105.51 96.85 103.54 94.68 172.99 129.94 129.9

85458 11 12 14 lC 13 16 ACTUAL FAILURE RATE 0.4000 0.1000 C.1000 C.100C 0.1000 PLANNEC TEST TIPE 0.4663 0.4683 1.4252 1.4252 1.4252 1.4252 . 1-6252 1.4252 PCCEL ESTEMATE 0.7355 0.7320 C.3303 C-2486 C.2230 G.2152 C-2373 C.2224 ESTIPATE ERRCE AS BERCENTAGE OF ACTUAL PASULE PATE 43.89 43.CS 230.34 148-63 123.04 115.36 137.27 SOFFLE STC CEVIATION 0.1708 0.5162 0.5231 0.4434 C.2996 1405.0 9.3124 C.140C CLAULATINE TEST TIME 12.654 14.742 25.722 37.201

7.7400

€.7300

10.1500

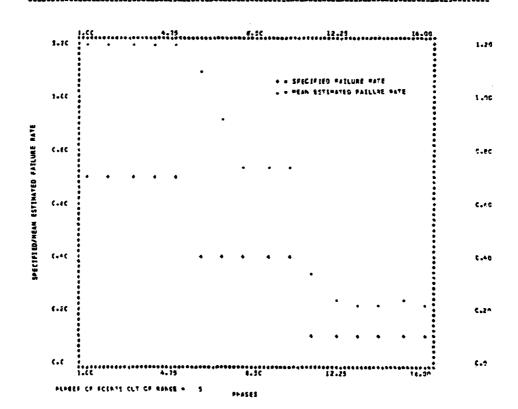
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5-6300

CLPLLATINE FAILLRES

4.4600

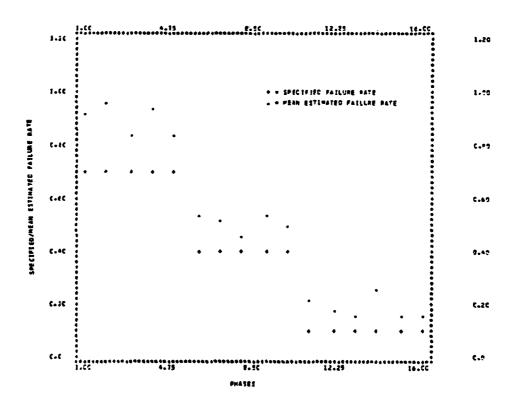
6.5700



CASE 6

PEASE	1	2	3	4	•	•	7	
ACTUAL PAILLRE MATE	C.7COC	0.7660	0.7000	C.7960	C.700C	0.4066	6.4566	£.4166
PLANNEC TEST TIPE	0.2322	0.2372	0.2122	(.2322	6.2322	0.4043	0.4663	0.4063
PCC6L 8117×178	0.9152	0.9240	0.8404	(.5337	C.8456	0.5447	0.5254	C.4668
ESTIPATE BERCE ASTUAL PAILUFE FATE	21.32	37.60	20.05	33.38	21.37	34.47	21.41	14.45
SAPPLE STC CEVENTICA	0.5676	0.5522	0.4664	C.4841	C.5002	0.4419	0.4615	0.1193
CLPLLATENE TEST TIPE	2. <u>1</u> 30	4.217	4.441	4.553	16.729	14.459	10.287	22.093
CLPLLATIVE PAILURES	1.3500	3.0100	4.3100	5.9200	7.0400	4 . eecc	7.940C	11.1796

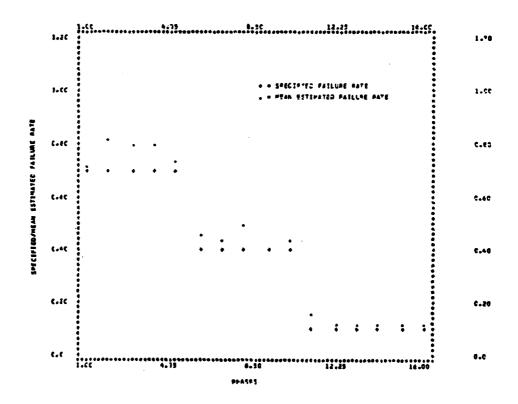
FFASE 11 16 16 ACTUAL PAILLAGE SATE C.4000 0.4666 0.1000 0.lccc 0.1500 PLANACE TEST TIME 0.4563 0.4623 1.4252 1.6252 1.6292 1.6252 1.4252 1.4252 PCCEL ESTIMATE 0.5485 8015.0 0.5073 C.1753 C.1545 0.2:44 C-1553 9.1e76 ETT INATE ERRCE LE PETCAL PARTIE 27.22 24.42 114.84 SOPPLE STE CEVIATION C-1891 0.3280 0.3646 6-2033 C-1187 1.0254 0.0535 C. 14*5 CUPLIATING TEST TIPE CLPLLATIVE FAILURES 12.75C0 15.39CQ 15.0200 ac.seco 14.0200 17.45GC



CASE 6 26 ITEPS

P>411	1	2	3	4	5	4	7	•
ACTUAL PAILLEE PATE	0.7000	0.7666	0.7000	6.7200	6.7666	0.400	C.4CCC	,¢.4060
PLANAET TEST TIPE	4.2322	0-5355	0.2322	C-5355	C-2322	0.4643	6.4663	C.4C43
PCGEL ESTIPATE	6.7221	Q. 6111	0.7570	Ø.7949	6.7354	0.4564	0.4489	9574.3
BETTATE EFFCE AS BEFCENTAGE OF ACTUAL	3.54	15.84	13 -46	13.54	3.11	12-64	12.24	22.21
SAPPLE STC CEVIATION	0.4687	0.4161	0.3854	C-3754	6-4243	0-2427	0.1446	0.2414
CLPLLATINE TEST TIPE	4,294	4.541	12.442	17-130	21.415	24.401	16.416	43.831
CLPLLATIVE PAILURES	2.7700	4.0500	9.2000	17.300C	15.5100	14.6766	21.0202	24.3960

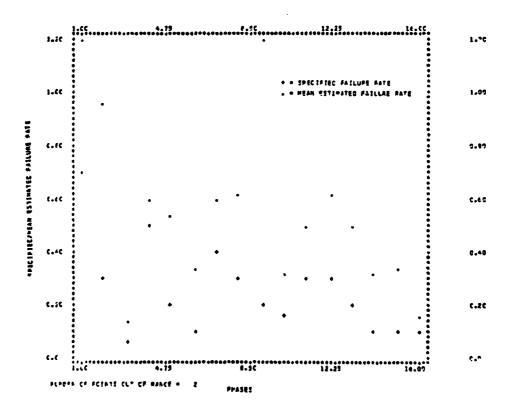
.... 4 10 11 15 13 14 15 14 ACTUAL FAILURE PATE 0.4000 0.1000 c.loaa C.1 CCC 6.100 0.1000 0.1000 C-4CCC PLAPAGE TEST TIPE C-4C63 0.4663 1.6252 1.6252 1-4252 1-4252 0,4423 C-1151 0.1168 C.1273 C. 1224 PCCEL ESTIMATE C-4C87 0-1478 C-1266 COTTMATE CRACK AS ACTUAL PARCE FOR FATE 27.20 2.17 10.58 47.83 24-62 15.04 16.76 22-4C PAPELE STE CENTATION 6.6175 G. Ce0# 0.2044 9.2269 0.1402 C.0588 6.6479 6.6554 CLPCLATIVE TEST TIPS 51.373 54.656 EE. ELE 118-487 346.455 178.515 20E.545 778.677 CUPLLATIVE PATLUAGE 27.0300 30-0400 33.1700 24.4400 25.4300 43.5766 45.2600 4F. 27GC



GASE 15 5 ITEPS

4	\$	3	4	5	4	7	•
4.7600	0.200	8.0:00	(.5CGC	C.200C	6.1666	C.400C	8.3576
0.2322	0.5417	3.2504	C-3250	C.8124	1.4252	0.4643	t.5417
1.5230	0.4234	0.1409	C-6078	C-54C7	6.3337	0.5942	6,6176
117.57	217-47	161.70	21.55	176.34	211.12	44.74	175.84
		0-2124	C.5533	C.4577	0.3145	C.4937	C.4566
1,074	3.!73	18.481	15.440	22.722	31.229	33.112	39.579
0.7500	1.9200	2-140¢	1-5500	3-3366	4.2700	4.5466	5.6460
	4.7000 6.2322 1.5236 117.57 1.0093	0.7co0 0.2cc0 0.2222 0.5417 1.5236 0.4236 117.57 217.47 1.0co3 0.6236 1,c74 3.573	0.7000 0.2000 0.0000 0.2322 0.5417 3.2504 1.5230 0.4234 0.1404 117.57 217.47 181.70 1.0093 0.8234 0.2124 1,074 3.573 18.481	0.7000 0.2000 0.0000 C.5000 0.2322 0.5417 3.2504 C.3250 1.5230 0.4234 0.1409 C.6070 117.57 217.47 181.70 21.55 1.0093 0.8239 0.2124 C.5533 1,074 3.273 18.481 15.000	0.7000 0.2000 0.0000 0.2000 0.2000 0.2322 0.5417 3.2504 0.3250 0.6126 1.5230 0.6234 0.1409 0.4078 0.2407 117.57 217.47 181.70 21.55 170.34 1.0093 0.8239 0.2124 0.5533 0.4577 1.074 3.573 18.461 19.490 22.722	0.7000 0.2000 0.0200 C.5000 C.2000 C.1000 0.2322 0.5417 3.2504 C.3250 C.8124 1.6252 1.5230 0.4236 0.1409 C.4078 C.5407 G.3337 117.57 217.47 181.70 21.55 17C.34 232.72 1.0093 0.8239 0.2124 C.5533 C.4577 0.3185 1,074 3.573 18.481 15.490 22.722 31.225	0.7000 0.2000 0.0000 C.5000 C.2000 C.1000 C.4000 0.2322 0.5417 3.2504 C.3250 C.8124 1.4253 0.4043 1.5230 0.4136 0.1409 C.4078 C.5407 0.3237 0.5942 117.57 217.47 181.70 21.55 170.34 233.72 44.76 1.0093 0.8239 0.2124 C.5533 C.4577 0.3125 C.4437

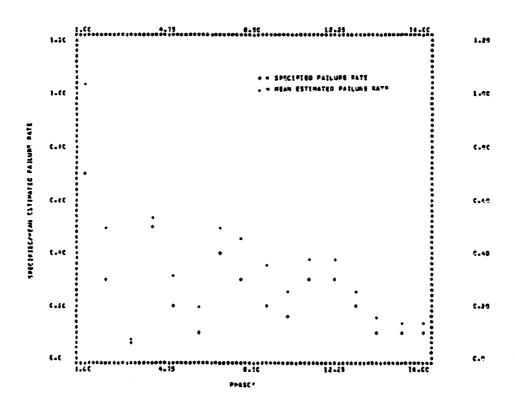
P+45E 10 11 12 13 14 1: 10 ACTUAL PAILURE RATE E-2000 0.1500 0.3000 C-3000 C.2000 CHICCC C.1666 0.1555 SAIF TEST TIPE 1.0825 0.5417 C-5417 1.4392 1.4292 1.4252 C-8124 C.8124 C.6131 PCCEL ESTIMATE 2.4787 0,3158 C.3279 C.3341 C.4945 C.5051 G. LeeC PERIPATE PARCE ACTUAL 1135.34 113.20 64.82 164.37 192.53 221.66 224.14 SAPPLE STC DEVIATION 0.3734 C.3243 0656.3 1.2141 14.8275 0.2424 C.3494 C-1967 CUPULATINE TEST TIPE 44,288 44.744 49.254 92.005 40.484 48.657 CLPLLATIVE PAILLAGS 7.3600 4.3100 4.7000 1.2766 10.2500 11.0700 4.3500 11.7700



CASE 15

P>451	1	5	3	4	5	•	7	
ACTUAL FAILUPE MATE	6.7666	0.3669	0.0:00	(.5066	C.2000	6.1908	0.4000	ç. •- • • • • • • • • • • • • • • • • • •
PLANNES TEST TIME	0-5315	0.1417	3.2564	C.3250	C.4124	1.6252	6.4CeJ	C.9417
PCGEL	1.0362	0.5081	0.0731	(.5402	C.3202	0.2040	C.5640	0.4673
PRICE PRICE CONTACT ACTUAL	48.44	65.36	46.26	0.05	46.65	102.55	29.44	99.77
SAPPLE STE CEVENTICA	0.5344	9.3429	0.0726	C-4624	C.2794	0-2226	6.2795	C. 2764
CLPLLATINE TEST TIPE	2.104	7.083	37-101	40.109	47.404	42.374	44.364	71.202
CLPLLATINE FAILLAES	1.7700	3.3:30	4.8500	4.3000	7.8200	1.27CG	16.4860	12.4700

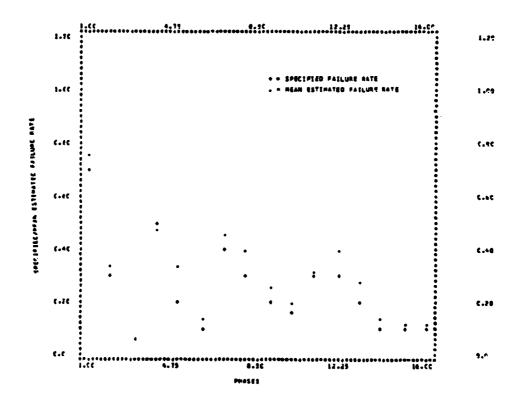
-10 11 12 13 14 15 14 ACTUAL PAILLRE MATE C.2CGC C-15C0 0.3000 C.300C C.2008 C-1CCO 0.1566 G. ICCC PLANAEC TEST TIPE 0.8124 1.0819 C-5417 (.5417 2.6126 1.4252 1.4292 1.4292 PCCEL ESTEPATE C.3563 0.2534 C.3411 C.2654 0.1643 C.145e C.1472 0.3860 PRICEPTAGE CF ACTUAL 75-14 48.54 29.34 27.04 24.71 41.25 44.42 44.22 SAPPLE STC CEVIATION 0.3430 0.2358 0.2434 C.1952 0.1142 0.1032 0.1624 C.2299 CLPLLETIVE TEST TIPE 74.748 88.725 13.707 58.702 164.248 121.105 134.257 151.142 15-5700 CLPLLATIVE FAILURES 13.4500 14.8503 14.4400 14.4200 21.4100 23.2900 24.6700



CASE 15

5+42 1	1	2	1	•		4	7	•
467LAL FAILLEE BATE	0.7500	0.3660	0.C50C	(.5000	2225.7	6.1666	4.4756	332**3,
94444	0.2322	0.5417	3.2104	C-3250	C-8126	1.4292	£.4643	C. !411
PECEL BETEPATE	0.7422	0.3412	4.0421	C.4766	C-3400	C.1363	6.4133	C.2510
PARCENTAGE CP ACTUAL	0.81	11.75	24.2!	4.41	72.48	34.35	13.37	30.59
\$40 FLE \$10 CEVEDTECA	C.4305	00.1445	0.0176	C.3083	(.7174	0.6145	Ç.24?4	4.7677
CLPLCATIVE 1857 TIPE	4,272	14.268	74.646	10.008	\$1.034	124.511	132.744	142.276
CLPLLATINE FAILURES	2.9400	5.0100	9.0006	11.7696	14.7366	14.656	23 -92 (6	74,4906

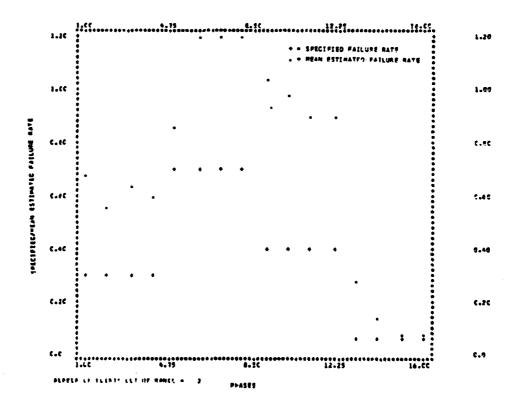
FP418	4	16	11	12	13	14	19	16
ACTUAL PASSURE BATE	6.2600	0.1560	0.3600	C-3000	C.200C	C.1CC0	9.1000	0.1575
PLAPPEC TEST TIME	C.8124	1.005	C.5417	C.5417	C-6154	1.6252	1-4252	1.4292
PCCEL ESTIPATE	0.2545	0_1941	0.3250	6.3924	C.2753	0.1344	C.1140	C.1242
PARCETTAGE CF ACTUAL PARCET ST	20.23	25.40	4.34	10.80	17.44	14.15	14.56	24.24
SAMPLE STE BENTATION	0.1416	0.1076	0.1494	9.2556	(.1836	0.0751	c.c5c5	C.178C
CLPLLATINE TEST TIPE	197.243	177.242	167.247	157.196	212.194	242.113	272.250	365.36+
CLPLLATINE PAILLEES	27.4600	30.4300	33.4160	24.6400	34.6100	42.4468	49.4966	48.4256



CASE 16 S ITEMS

****	1	5	3	•	\$	•	7	•
ACTUAL PAILLING MATE	£.3c0¢	0.3000	0.3000	C.300C	C.7066	0.100	0.7CCC	6.7666
PLANAIC TEST TIPE	0.5417	0.5417	0.5417	C.5417	6.2322	0.2322	6.5155	0.2172
PCGEL ESTIPATE	0.4854	0.5447	0.6498	C.9517	C-07C0	1.2714	1.4143	1.4776
· BITTO ATT CEPTCE ACTUAL	120.55	88.50	114.40	97.23	24.26	41.44	165-64	116.27
SAPPLE STE CEVEATION	C.3624	0.3011	0.3408	C-4396	6.7138	0.0571	0.8548	0.6124
CLPLL#71VE 1931 TIPE	2,564	5.642	7.507	10-020	11.114	12.158	13.223	14.200
CLPLLATIVE FAILURES	C.7100	1.4200	2.2100	2.7890	1-3400	4.2760	4.8100	9. 5700

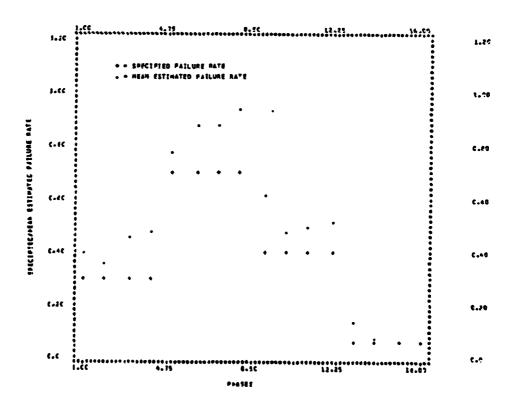
**** 10 11 12 13 14 16 SCTUSE PATLUFE FATE C.4CGC 0.4666 0.4000 C.400C C.CSCC 0.0500 e.esce e.cscc PLANNES TEST TIPE 0.4063 0.4043 C.4043 1.2504 . 3.2564 3.2504 1.2564 0.4643 PEGEL ESTEPATE 1.0444 0.4850 0.8552 C.9081 4.2746 0.1447 C.CE24 0.6715 PRECENT CE CONCENTRAL 141.72 147.24 124-61 127.02 444.56 185.42 46.77 41.CE SAPPLE STE ERVIATION C.7404 0.4487 0.5723 C.4434 0.2637 0.1450 C.2971 0.0445 CUPLLATINE TEST TIPE 14.144 18.557 19.541 21.804 34.745 \$1.570 47.144 82.335 CLPLLATIVE PAILUAES 4.3500 7.4463 7.4500 E-4900 1.7800 10.4666 11.0600 11.5100



CASE 18 18 ITEP!

P>41E	1	2	3	4	5	•	7	•
ACTUAL FAILURE RATE	C.3C00	0.3600	0.3000	C.3000	C.100C	C.1668	6.7950	G. 7566
3417 7187 3144649	0.5417	0.5417	0.5417	C.5417	C-2322	0.1112	0.2322	C.2322
PCCEL ESTIPATE	0.4691	0.3625	6.4566	6.4797	C-7845	0.4461	0.4776	0.5477
מון	34.26	26.17	50-21	51.81	17.02	12.72	29.29	19.77
SAPPLE ETC GENIATICA	0-2150	0.2511	0.2874	C.2759	C-4851	C-4285	0.5265	C.5564
CCPCLATIVE TEST TIPE	-4.927	1.532	14.858	19.747	21.904	24.661	24.213	28.341
CLPCLATINE FAILLNES	1.5500	3.0400	4.7300	4.5600	1.4466	1.6468	ic . 91 cc	12.4766

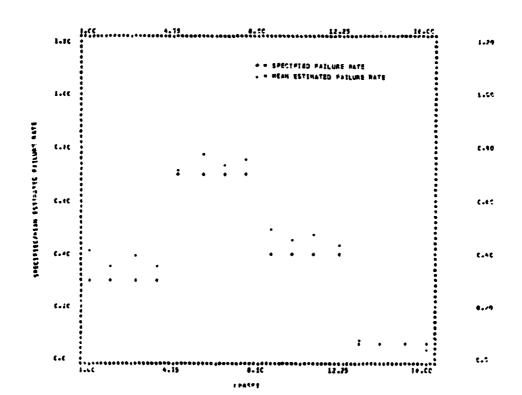
**** 16 11 12 13 14 15 16 ACTUAL PAILURE RATE 6.4500 0.4000 0.4000 C.4000 0.0500 C.0500 0.0500 9.0:00 PLANNET TEST TIPE 0.4643 0.4643 0-4642 C.4C43 3.2504 3.2264 3.2964 3.7204 PCEEL ESTIMATE 0.4137 -0.4628 0.4571 C-5100 C.1312 0.6745 0.0467 G. C555 ETTIPATE ERACE AS BERCEPTAGE CP ACTUAL PALLUE BATE 13.42 20.54 24.28 27.50 142.43 48.58 21.40 14.02 SAPPLE STE GENTATION 6.4241 0.3344 0.3326 C.3241 C-1774 0.1074 0.0458 C. E457 32.125 CLPLLATIVE TEST TIPE 35.450 39.705 43.459 72.610 103.736 132.755 162.586 CLPLEATINE FAILURES 13.6700 15.CECC 14-4200 17.6700 15.1700 20.6460 22.0400 23.62CC



CASE 10 20 17671

P+A11	1	1	3	4	5	•	1	. •
ACTUAL FAILURE RATE	6.3666	0.3000	0.3000	C.3000	C.1000	0.700	C.70CC	2.7666
PLAPARE 1881 1198	0.5417	0.5417	0.5417	C.5417	C.2322	C.2322	C.2322	C.2127
PC68L 6371PATE	0.4185	0.3916	0.4695	C.3481	C.7206	0.7845	C.7496	0.7902
PRICE PROPERTY ACTUAL	39 .45	17.25	36.50	22.76	2.54	17.24	7.68	7.17
14PFLE 178 DEVIATION	0.2905	0.1570	0.2566	C.1911	C.3447	0.4426	0.4265	C. 74C7
CLPLLATINE TEST TIPE.	1.594	19.964	25.846	35.508	44-204	46.475	52.744	57.679
CLPLLATINE FAILLPES	3.0300	9.4000	5.1 EGC	12.0400	14.8100	17.5566	23.0200	73. 112

**** 16 11 12 13 14 1: ACTUAL PAILURE RATE C.4CCG 3.4680 4.4464 C.4000 C.0500 0.6500 0.0100 0.0500 PLAPPEC TEST TIME 0.4063 0.4(23 £-4C43 C-4063 3.2504 3.2564 3-2504 3.2564 MCGEL ESTEMATE 0.5667 0.4449 0.4642 C.4427 C.C837 0.6521 0.0524 0.0482 STITUTE PATE ACTUIL 21.05 4.15 27.42 14.24 10.66 £1.30 4.65 3.44 SAPPLE STE CEVIATION 0.0321 0.3713 0.2430 G.2403 C.2282 C-0943 C.C289 0.0214 CUPULATINE TEST TIPE 79.547 £7.097 147.563 208.236 267.736 327.423 44.565 72.051 CLPCLATIVE FAILURES 29.6400 39.1100 20.9130 14.0300 10.5000 41.5400 44.6200 47.5000



APPENDIX D

Results of Test MOD2

1. Test MOD2

Test MOD2 used the AMSAA model to estimate the failure rate of the items tested except as described below. A more detailed discussion of the modification can be found in Section V-D.

Use of the AMSAA model was modified as follows:

a. The point estimate of the failure rate,

was used whenever cumulative test time over all items was less than 10 hours.

b. The slope of the reliability growth pattern was estimated using the current point estimate, r_p , and the previous estimate, \hat{r}_{i-1} , of the failure rate as follows:

SLOPE =
$$r_p - \hat{r}_{i-1}$$
.

Increasing slope was then determined from the following relationship:

$$r_{D} \sim \hat{r}_{i-1} \geq .2\hat{r}_{i-1}$$

If the slope was increasing, the point estimate, r_p , was used as the current estimate of the failure rate. Then, the AMSAA model was reinitialized, that is, time and failures prior to an increasing slope were not considered in future estimates made by the model.

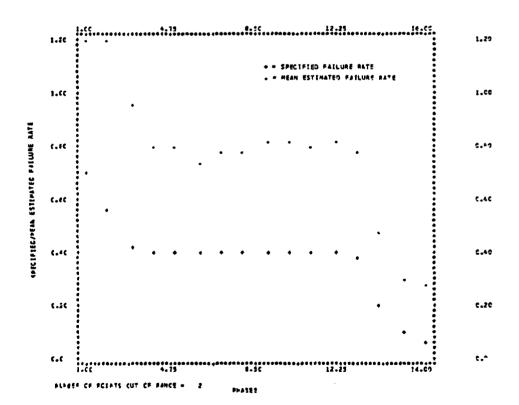
2. The Results

Results for Cases 4, 6, 15, and 18 are presented here as representative of the effect the modifications had on the performance of the model. A detailed description of the format of the results can be found in Appendix A.

CASE 4

PPASE	1	i	3	4	5	4	7	•
ACTUAL PAILUPE PATE	¢.7C80	0.550	0.4250	C.405C	(.4666	0.4666	C.4CCC	0.4000
PLANNEE TEST TIME	G-5355	0.2455	0.3824	C.4013	C.4C43	0.4663	0.4663	¢.4663
PCCEL ESTIMATE	1.3244	1.3166	0.9675	C.8075	C-6047	0.7462	0.7747	0.7641
BETTI-11 EFFCR 15 BERCENTIGE CF ACTUAL FAILLE FATE	89 .49	135.74	127-44	\$9.37	161.48	E4.5£	94.68	46.03
SAPPLE STE CEVIATION	0-6578	0.7415	0.4545	C.4593	C.4455	0.4834	8.4441	C. \$57C
CLPLLATINE TEST TIPE	1.074	2.416	4.202	6.649	7.942	4.641	11-657	13.500
CLPLLATIVE FAILLRES	C.4400	1.4300	2.0500	2.8900	3.5500	4.1566	4.9008	5.1766

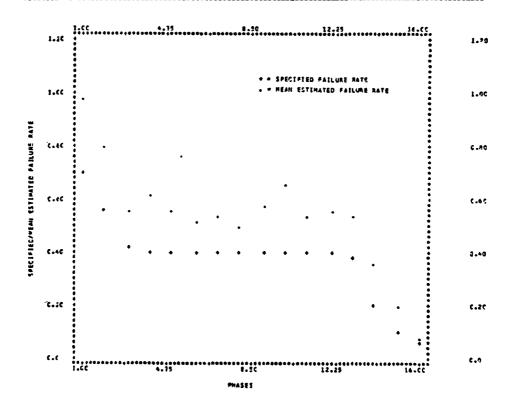
P+45 6	9	10	11	12	13	14	1:	14
SCTUSE PAILURE RATE	C-4CGC	0.4000	0.4000	C.4000	C-3750	0.2000	C-1000	6.0500
PLANAGE TEST TIME	0.4682	0.4663	0.4663	C-4063	¢.4334	C.#126	1.6252	3.2504
PCCEL ESTIPATE	5818.0	0.8239	0.7924	C.8124	C.7898	0.4846	0.2966	0.2921
ESTIDATE BARCA ASTUAL PRACELAL	104.55	105.58	98.21	103.11	110.42	142.26	150.57	464.13
SAPPLE STE CEVIATION	0.4993	0.4621	0.4572	G.7451	C-7571	6.4203	0.3418	1.5465
CLPLLATINE TEST TIPE	15.442	17.319	19.184	21.049	23.075	24.840	34.324	49.354
CLPLLATIVE PAILLRES	6.4488	7.1100	7.7600	E.3400	9.17GC	lC.CECO	10.4900	11.5866



CASE 4

92449	ı	2	3	•	5	•	7	ŧ
ACTUAL PARLURE RATE	C. 7CC0	0.5:67	0.4250	C.4050	C.40G0	0.4000	C.4666	C.4CEE
9427 T28F 39446JR	0.2322	0.2555	0.3624	C.4013	C.4Ce3	0.4643	0.4663	9-4642
PCCEL ESTIPATE	C.9735	0.7546	0.5431	C.6275	C.5517	0.5162	0.5320	0.4470
ESTIDATE ERRCH AS BERCENTIGE OF ACTUAL FAILURE FATE	29.13	44.48	32.50	, 54.94.	27.42	24.04	11.24	21.25
SAPPLE STC CEVIATION	0.4685	.0.5476	0.3305	C.6033	C.2743	0.3771	C-3627	0.3044
CLPLLATIVE TEST TIPE	2.136	4.667	1.462	12.133	15.463	15.633	23.410	27.199
CLPLLATIVE FAILURES	1.5400	2.0:00	4-1100	5.7400	7.16CC	4.4160	10-1000	11.4100

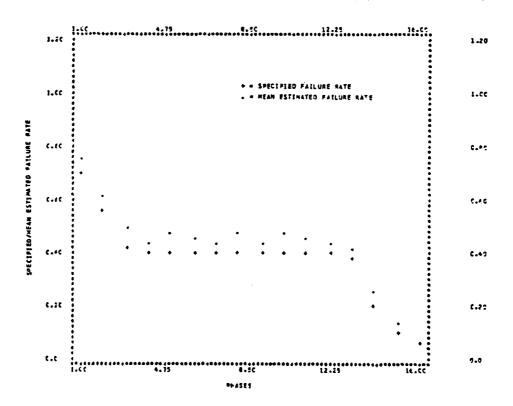
10 11 12 15 15 ACTUAL PAILURE RATE 0.4000 0.4000 0.4306 0.2000 C-1CCC 1.0500 C.400C C-375C FLEANEC TEST TIPE 0.4063 0.4063 0.4663 C-4063 0.8124 1.6252 3.2504 PCCEL ESTIPATE 0.5740 0.6525 0.5374 C.5670 C.5484 0.2601 G.154C C. CE94 ETTIDATE EFFCH AS BERCENTAGE OF ACTUAL PARLISE PATE 43.51 43.11 34.35 41.75 46.23 EC. C4 55.58 76.71 SAPPLE STE CEVIATION C.3474 1.4556 0.3229 (.3362 C.3533 C.1523 CUPLIATIVE TEST TIPE 30.542 34.723 48.585 34.459 42.187 46.176 52.627 58.301 CLPLLATIVE FAILURES 12.9700 14.4500 16.0100 17.2200 18-6200 20.5800 22.1990



C45E 4 20 TTEPS

1	2	3	4	9	•	7	•
Ø.7C00	0.5:00	0.4250	C.405C	(.4666	£.4CCQ	C-4CCC	C.4CCC
0.2322	0.2555	0.3824	C-4013	C-4063	Q.4C63	C.4C43	9.466?
0.7574	0.6134	0.5010	C.4458	C-4752	C.4567	G.4448	C.47C3
8.23	11.53	17.46	. 10.07	15.81	12.67	11.19	17.56
G.41EC	0.3452	C-2728	C-2614	C-3128	0.2457	C-2144	0.2141
4.313	9.758	14.474	24.303	31.794	15.127	46.755	54.188
2.9500	5.8eC0	8.8700	11.7100	14.7100	17.6163	2C-830C	23.5500
	0.2322 0.7574 6.23 0.4180	0.7000 0.5500 0.2322 0.2555 0.7574 0.6134 8.23 11.53 0.4180 0.3452	0.7000 0.5200 0.4250 0.2322 0.2655 0.3824 0.7274 0.6134 0.5010 8.23 11.23 17.88 0.4180 0.3452 0.2728	0.7000 0.5900 0.4250 C.4050 0.2322 0.2555 0.3824 C.4013 0.7274 0.6134 0.5010 0.4458 8.23 11.93 17.88 10.07 0.4180 0.3452 0.2728 C.2614	G.7000 0.55CC 0.4250 C.405C (.40CC 0.2322 0.2555 0.3824 C.4013 C.4062 0.7574 0.6134 0.5010 0.4458 C.4752 8.23 11.53 17.88 10.07 15.81 0.416C 0.3452 C.2728 C.2614 C.3128 4.213 9.758 14.874 24.303 31.798	0.7000 0.5900 0.4250 0.4050 0.4000 0.2000 0.2322 0.2555 0.3824 0.4013 0.4062 0.4062 0.4063 0.7274 0.6134 0.5010 0.4458 0.4752 0.4507 8.23 11.93 17.88 10.07 15.81 12.67 0.4180 0.3452 0.2728 0.2614 0.3128 0.2457	G.7000 0.52CC 0.4250 C.405C C.4CCC C.4CCQ C.4CCC 0.2322 0.2555 0.3824 C.4013 C.4062 0.4C63 C.4C62 C.4C62 0.7274 0.6134 0.5010 0.4458 C.4752 C.4207 G.4448 8.23 11.23 17.88 10.07 15.81 12.67 11.15 C.416C 0.3452 C.2728 C.2614 C.3128 0.2457 C.2144 4.213 9.758 14.874 24.303 31.798 25.227 46.755

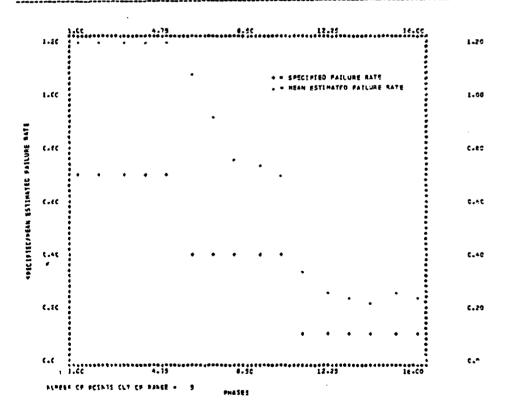
10 6.4632 C.375C c.2CC0 PLANNEC STEST TIPE C.4C43 0.4663 0.4643 C-4063 C.4334 0.6126 1.6252 1.2504 0.4769 0.4534 C-4203 11.11 17.72 13.40 16.10 12.67 26.53 40.30 SAMPLE STC CENTATION 6.2036 0.2357 0.2162 C.2134 C-2216 CUPULATIVE TEST TIPE 41.676 69.122 €4.172 \$2.154 167.154 74.672 CLPLL#TIVE FAILURES 27.0400 30.2200 32.8500 36.1700 35.0400 42.02CC 44.8GCC 47.8CGC



CASE 4

94416	1	3	1	4	5	6	,	t
ACTUIL PRILLING PATE	E.1600	0.1007	0.7000	C. 7699	C.1860	0.4000	2.4000	7.4000
PLANNEC TEST TIPE	0.2322	0.2322	0.2322	(.2322	6.2322	0.4(63	0.4043	0.466
+CCEL ESTEPATE	1.3452	1.4585	1.3739	1.4943	1.3421	1.6711	C.51 57	C.1634
ESTIPATE ERECH AS PERCENTACE CF ACTUAL PAILURE PATE	95.03	108.30	94.28	100.41	\$1.72	161.17	128.42	50.10
SAPPLE STE CEVIATION	0.434	Q.8648	0.7531	(.7801	C.6943	0.7107	0.6366	0.4655
CLPLLATINE TEST TIPE	1.641	2.126	3.209	4.305	5.374	7.210	5.075	15.466
CLPLLATINE FAILURE!	6.7490	1.4100	2.1160	2.8400	3.470C	4.4200	4.9600	. 6500

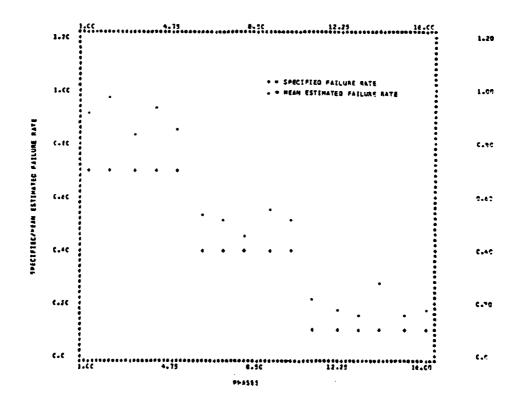
F>45E	•	10	11	12	13	14	15	16
ACTUAL PAILURE PATE	£.4000	0.400	g.1000	C.100C	(.locc	0.100	0.1000	c.1000
PLANNE TEST TIPE	0.4643	0.4663	1.6252	1.6252	1.6252		1.6252	1.6252
PCCEL ESTIPATE	C.7354	0.7696	0.3340	G.2607	C.2375	0.2262	C-25C7	C.2369
ESTIDATE ERRCA 45 SERCENTACE CF ACTUAL PAILLEE PATE	83,45	77.35	233.55	160-72	127.47	126.17	150.67	136.50
SERFLE STE CEVIATION	0.5135	0.5252	0.4373	C-2927	(.2092	0.1717	0.3109	0.1e37
CLPLLATINE TEST TIPE	12. #56	14.742	22.241	29.722	37.201	44.676	\$2.044	59.523
CLPLLATIVE FAILURES	6.6000	7.0200	7.8500	£.830¢	9.4300	16.1500	10.8903	11.5100



CASE 6

92155	1	2	3	4	9	4	7	•
ACTUAL PAILUPE MATE	0.7000	3.7660	6.7600	C.700C	C.1666	0.4066	C.4CCC	0.4000
PLANAEC TEST TEME	0.2322	0.2322	0.2322	C.2322	C.2322	0.4(63	0.4063	¢.4642
PCGEL ESTIMATE	0.9192	0.9703	0.8404	C.9337	C.8568	0.5468	0.9277	C.4944
RETINATE EFFCE AS FRECENTAGE OF ACTUAL FAILURE FATE	11.31	36.62	20.65	23.31	22.40	36.71	21.53	12.54
SAMPLE STO CEVEATION	0.5679	0.5512	Q.4C64	C.4841	0.4544	C.4443	0.4024	C. 2753
CLPLLATINE TEST TIPE	2.158	4.217	4.441	4.553	10,725	14.455	16.267	27.097
CLPLLATINE FAILLARS	1.3500	2.9500	4.3160	1.9200	7.0400	8.44C0	9.5860	11.1700

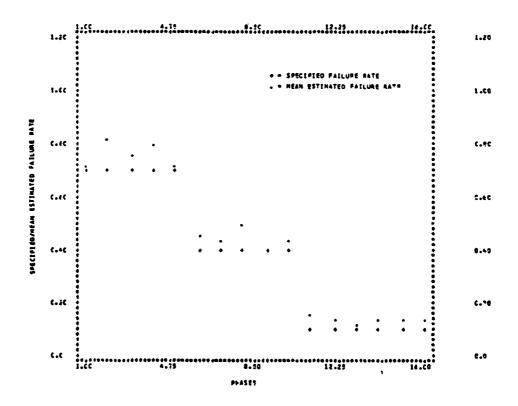
11 16 10 12 C. 1600 C.1000 ACTUAL PATLURE RATE C.4CCC 0.4003 0.1000 C.1000 0.1000 0.1CCC PLAPACE TEST TIPE 0.4642 1.4252 1.4252 1.6252 PC0EL ESTIMATE 0.5524 0-2114 C.1731 C.1566 0.2652 0.1744 0.5131 C-1665 ESTIDATE EFFCE AS PERCENTACE OF ACTUAL 165.23 14.65 28.10 28.27 111.36 72.07 28.66 ee.4E SAPPLE STC CEVENTICK 0.3345 0.2549 0.2015 C-1854 0.1254 1.6424 CLPLLATENE TEST TIPE 25.631 44.552 119.306 29.565 19.412 14.438 CUPULATIVE FAILURES 12.7500 13.9400 15.3500 17.4500 14.0200



CASE 4

124.4	1	2	3	4	5	€.	3	•
ACTUAL PATLLYE MATE	C.7C0G	0.760	8.7000	C - 70GC	C.7000	0.4060	C.4000	Ç.Arce
PLADAGE TEST TIPE	0.2322	0.2222	C.2322	C-2322	C-2322	G.4(£3	0.4563	2.4003
PCCEL ESTIMATE	0.7251	0.6171	0.7419	C.7920	C.7207	0.4545	0.4450	0.4441
PRILLIPE EAST ACTUAL PRILLIPE EAST	3.58	14.72	8.84	12.14	4.10	13.44	11.46	*1.57
SAPPLE STC CENTATION	G.4C87	0.4678	0.4644	C-3825	C.431@	0.2423	G-1882	C. 2411
CLALLATENE TEST TIPE	4.254	1.561	12.442	17.130	21.415	28.503	36.416	43.831
CLPLLITIVE FAILURES	2.7760	6.0000	1.2000	12.3000	11.2166	10.0700	21.0200	24.3000

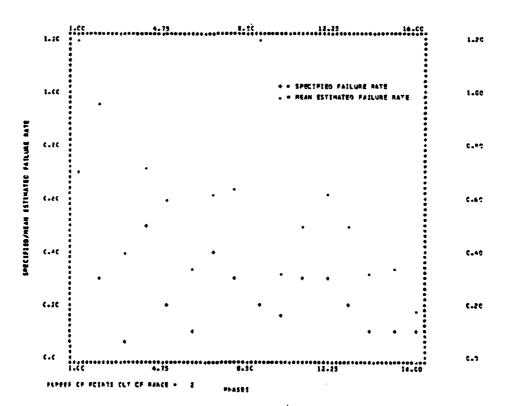
P+456	•	10	11	12	13	14	15	16
ACTUAL PASLUPE MATE	C.460G	0.400	0.1000	C-1000	C.1000	0.1000	0.1000	c.1676
PEARATE TEST TIPE	0.4643	0.4663	1.4252	1.4252	1.4252	1.4252	1.6252	1.6252
PCC8L 6811PATE	0.4630	8.4359	0.1445	C-1304	C-122C	0.1365	6.1782	C. ' 705
ESTIPATE BERCA CTÚIL	0.74	5.52	44.48	30.57	21.58	26.22	20.15	30.67
SAPPLE STC CEVIATION	0.2055	0.2249	0.1760	C-0585	C.C487	0.1136	0.1131	0. (489
CLPLESTIVE TEST TIPE	51.373	58.674	84.418	118-487	146.456	178.516	206.949	239.637
CLALLATIVE FAILURES	27.0300	30.0400	33.1700	34.4600	15.43CG	41.5700	45.2600	49.2260



CASE 19 5 17691

FFASE	1	2	3	4	5	ŧ	1	•
ACTUAL PAILUPE PATE	C.7CC0	0.3640	0.0:00	C.5000	C.2CCC	C.1CC6	0.460 0	6.3566
PLANNEE TEST TIME	0.2322	0.5417	3.2964	C.325C	C-8124	1.6252	C.4(43	0.5417
PCC86 ##11PATE	1.5230	0.5658	G.4C!0	C.7188	C.1982	0.2474	C.41!4	C.e?e2
ESTIMATE EMECH AS FREEDINGE CA ACTUAL PAILURE MATE	117.57	223.26	711.51	. 43.77	155.16	241.40	93.64	111.11
SAPPLE STC GENERATION	1.0053	C.8302	0-8308	0-4276	C-#C43	0.3721	e.scel	C.4725
CLPLLATIVE TEST TIPE	1.674	3.:73	14.461	19.990	22.722	31.225	32.112	39.975
CLPLLATINE FAILLRES	0.7500	1.4860	2.1400	2.9300	3.5100	4.7260	4.5466	5.7466

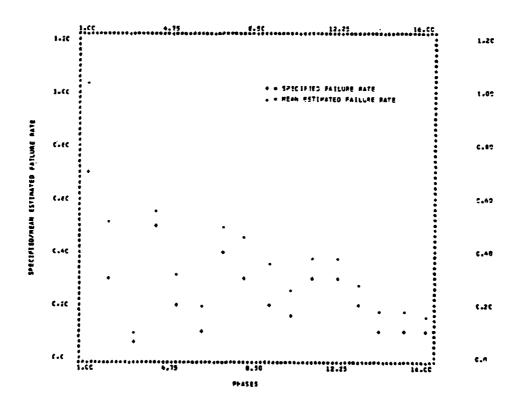
le ACTUAL PAILUPE MATE 6.3600 C.3000 C-20CC C.1CCO G.10CC 0.1000 C-2 CGG 0.1:50 SALT TEST DEAGAST 0.8124 1.0635 0.5417 6.5417 C.ElZe . 1.6152 1.4252 1.6752 2.5014 C.1783 PCCEL ESTIMATE 0.32CL C.45EC C.6164 C.499Z G.3215 C.34CS 1150.8C 113.35 44.01 105-44 145.55 221.54 246.53 76.34 SAPELE STE CENTATION 15.8357 0.2558 0.3740 C.3707 C.3226 0.5710 1.3138 CUPULATIVE TEST TIPS 68.047 79.725 39.351 44.268 44.764 45.254 53.005 46.484 8.3100 €.7000 6.570C 10.3666 11.0700



CASE 15

1	2	1	4	5	4	7	•
C.7C89	0.300	0.0500	C.5000	C.2086	0.1068	0.4000	¢.3000
0-2322	0.5417	3.2964	6.3250	C.8124	1.4252	C.4Ce3	0.2417
1.0352	0.5102	0.0587	C.5584	C.3248	0.1532	0.4522	C.4eG3
48.46	72.14	47.43	11.49	43-41	51.24	22.04	22.43
0.5384	0.3643	0.1555	C.4639	C.2904	0.17:9	0.3322	C. 2694
2-104	7.083	37.101	40-105	47.464	42.574	66.304	71.242
1.7766	3.2400	4.8500	4.3000	7.8200	1.2700	10.4600	12.4700
	0-2322 1-0352 48-46 0-5388	C.7C00 0.3CC0 0-2322 0.5417 1.C352 0.5182 46.46 72.74 0.5386 0.3443 2-104 7.C63	C.7C00 0.3CC0 0.0500 0-2322 0.9417 3.29C4 1.C352 0.5102 0.0587 48.44 72.74 97.43 0.5384 0.3443 0.1555 2.104 7.C03 37.101	C.7C00 0.3CC0 0.0500 C.5070 0-2322 0.5417 3.25C4 C.325C 1.0352 0.5182 0.0587 C.5584 48.46 72.74 97.43 11.45 0.5388 0.3443 0.1555 C.4638 2.104 7.063 37.101 40.105	C.7C00 0.3CC0 0.0500 C.5000 C.200G 0.2322 0.5417 3.25C4 C.325C C.6126 1.0352 0.5102 0.0687 C.5584 C.3248 48.46 72.74 97.43 11.69 03.41 0.5384 0.3443 0.1555 C.4639 C.2906 2.104 7.C03 37.101 40.105 47.6C6	C.7C00 0.3CC0 0.0500 C.5000 C.200C 0.10CB 0.2322 0.5417 3.29C4 C.325C C.6124 1.4252 1.6252 0.5102 0.0987 C.5584 C.3268 0.1522 48.44 72.74 97.43 11.65 62.41 52.24 0.5384 0.3443 0.1555 C.4639 C.2904 0.1729 2.104 7.C03 37.101 40.105 47.466 42.578	C.7C00 0.3CC0 0.0500 C.5006 C.200C 0.1008 0.4CCC 0.2322 0.5417 3.25C4 C.325C C.6124 1.4252 C.4C63 1.C352 0.5182 0.0487 C.5584 C.3248 0.1522 0.4522 48.44 72.74 97.43 11.49 62.41 52.24 22.C4 0.5384 0.3443 0.1555 C.4634 C.2904 0.1759 0.3322 2.104 7.C83 37.101 40.105 47.4C6 42.576 46.304

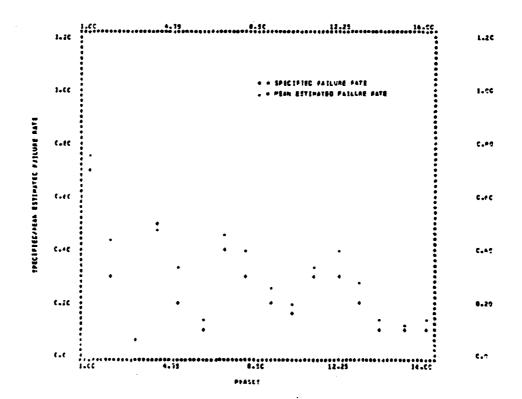
16 SCTUSE PAILURE MATE C.2000 0.1500 C.3C00 C.2000 0.1000 PLAPNEC 1851 TIPE 0.5417 PCCEL ESTIPATE C.3500 0.3859 C.2745 C.17Ce 0.2513 PETTIPATE PRECE AS ACTUAL PATLLES PATLLES PATLLES 75.00 28.64 28.13 . 28.43 0.3357 0.2239 C.2123 0.1212 86.725 166.248 CLPLLATIVE TEST TIPE 18.788 53.707



CASE 15

P+41E	1	2	3	•	5	•	7	•
ACTUAL PAILUPE PATE	0.7600	0.3660	0.0100	C. 5000	C.260C	6-366	0.400	ç.:csc
SAIT TEST TEST	0.2355	0.5417	3.2504	C.325C	C-4154	1.4352	C.4C43	C. 5417
PCCEL &!71PATE	0.7422	0.4363	0.0415	Ç.4774	¢.3349	4-1364	0.4143	C.3522
ESTIPATE EFFICACTURE	1.45	44,43	22.42	4.48	41.42	26.44	13.54	10.73
SAPPLE STE EENTATICK	6.4265	0.3160	0.0310	6.3073	C-11C3	C.Ctel	0.2414	C.2472
CUPULATIVE TEST TIPE	4.272	14.254	74.066	10.094	69.034	124-411	132.344	142.276
CUPLLATIVE FAILURES	2.4500	5.0160	9.0000	11.7400	14.7366	14.0500	21.32CC	24.4960

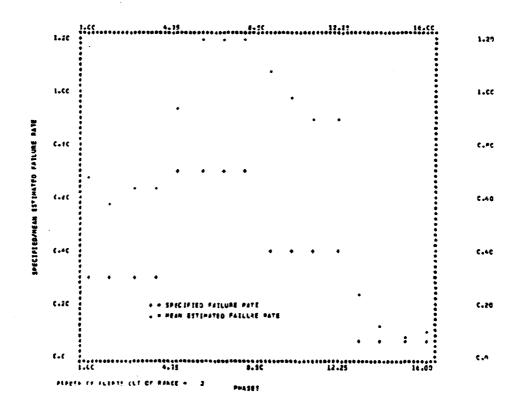
### !	•	16	11	12	13	14	1:	le
ACTUAL FAILURE RATE	C.2000	0.1500	0.3460	6.3000	0.2600	6.1666	0.1000	0.100
BLADARE TEST TIPE	0.4126	1.0625	0.5417	C.5417	C.6124	1.4252	1.6257	1.675
PCCEL ESTIMATE	0.2976	0.1545	C.335C	1.3963	C.2812	6.1463	6.1277	2.177
ESTIPATE EPRCE AS PERCEPTAGE CF ACTUAL FAILURE MATE	24.95	32.33	12.44	32.77	46.46	48.14	22.16	37.e
SAPPLE STE CENTATION	0.1416	0.1040	0-1548	C-2533	C.1020	0.0844	0.0525	6.124
CLPLLATIVE TEST TIPE	157.243	177.242	187-247	157.196	212.154	242-173	272-298	302.30
CLPLLATINE FAILURES	27.46GG	30.4368	33.4100	24.4400	19.4108	42.4400	45.45(6	47.5701



CASE 10 1 ITEMS

1	2	3	•	5	4	1	•
C-300C	0.3000	0.3000	C.3000	C.7066	E.1CC4	4.7000	a. 100C
0.5417	0.5417	0.5417	C.5417	(.2322	C.2322	C-2372	0.2172
0.6854	0.5759	0.6470	(.6409	C.432C	1.2516	1.4142	1.:(44
124.55	91.54	115.55	113.44	33.14	64.52	165-65	114.51
0.3624	0.3048	6.3514	C-3941	C-6545	6.8366	0.8341	C. 8525
2.509	5.642	7.507	10.020	11.114	12.156	11.223	14.206
0.7100	1.3300	2.1400	2.7800	3.3400	4.2706	4.9466	9.5766
	0.5417 0.6854 128.59 0.3824 2.509	C.300C 0.3000 Q.5417 0.5417 C.6856 0.3759 126.59 91.96 C.3624 0.3C48	C.300C G.3CGO 0.3CGO G.5417 0.5417 0.5417 G.6854 0.5759 G.6478 128.55 91.96 115.55 G.3824 G.3C68 G.3514	C.300C 0.3C00 0.3C09 C.3000 0.5417 0.5417 0.5417 C.5417 0.6854 0.5759 0.6478 C.6409 128.55 91.94 115.65 113.64 0.3824 0.3C48 0.3C14 C.3941 2.5C9 5.C42 7.507 10.020	C.300C 0.3C00 0.3C09 C.3000 C.70CC 0.5417 0.5417 C.5417 C.2322 C.6854 0.5759 0.6478 C.6409 C.632C 128.55 91.96 115.65 113.64 33.14 C.3824 0.3C68 G.3614 C.3941 C.6946 2.5C9 5.C42 7.507 10.020 11.116	C.300C 0.3C00 0.3C00 C.3000 C.7CCC C.7CCC 0.7CCC 0.5417 0.5417 C.5417 C.2322 C.	C.300C 0.3C00 0.3C00 C.3000 C.70CC C.1CC0 0.70C0 0.5417 0.5417 C.5417 C.2322 C.

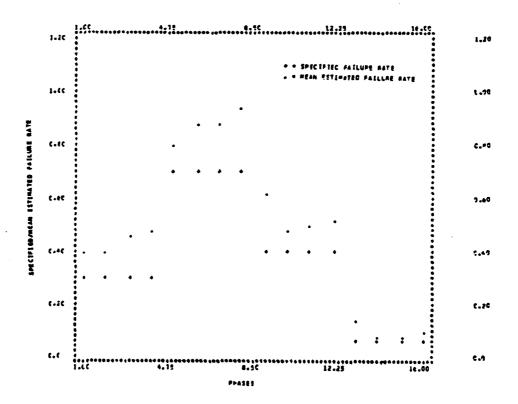
F+#19 10 11 12 . 13 le SCTUSE PATLUSE BATE C.4CCC 0.400 0.4600 C-4000 C.C500 8.0500 c.esce 0.0500 PLAPPEC TEST TIPE 0.4063 0.4663 C.4043 2-25C4 3-2504 3.2504 PCGEL ESTERATE 1.0843 0,5800 0.8554 C.1058 C.2407 C-1261 0.0863 0.0911 ESTIPATE ERRCE AS BERCEPTAGE CF ACTUAL FASILIFE BATE 171.Ce 145.61 123.65 124.46 381.37 156.22 12.93 **62.17** SAPPLE STC CENTATION 0.4214 0.8805 0.4514 C-4419 C-3437 0.2458 0.1268 3.6756 CLPLLATIVE TEST TIPE 14-146 18.057 19.541 26.765 51.570 CLPLLATIVE PAILURES 6.3500 7.45CC 1.7800 10.3500 11.0466



CASE 18 10 17691

P6328	1	2	3	4	5	•	7	ŧ
ACTUAL PARLUPE MATE	C.3CG6	g. 3CGG	6.3000	0.3006	C.7000	8.1000	e.7:ce	7.7000
PLAADEC 1817 11PE	0.5417	0.2417	C.5417	6.5417	C-2322	4.2322	6-5315	C.2322
+CCEL E171=47E	0.4C4F	0.3441	0.4504	(.4895	C.7903	0.4002	0.0770	0.4473
PATILIFE PATE PACTURE	36.36	21.37	50.13	47-14	12.46	25.74	11.15	31.11
SAPELE STE CENTATICE	0.2150	0.2343	C.2007	6.2789	C.4813	0.4384	C.5265	C. 2564
CLALLATINE TEST TIPE	4.527	4.532	14.858	19.747	21.565	24.661.	21.213	24.341
CLPLLSTİLE FAILLAES	1.5500	2.9700	4.7300	4.5400	7.5704	5.04CC	16.3160	12.4700

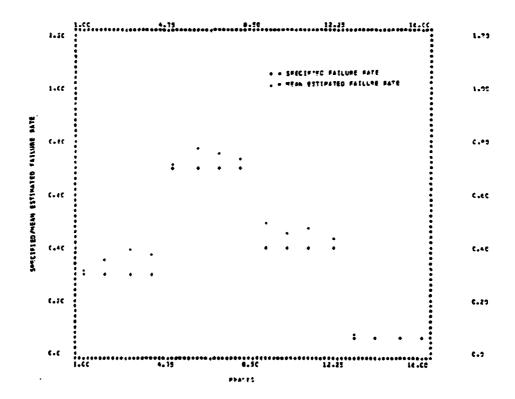
PP45E 10 11 12 13 14 1: ie ACTUAL PAILUPE MATE C.4CCC 0.4000 C.4C00 C.400C C-0500 0.0500 0.0100 C.C5CC FLANDEC 1827 TIPE 4.4C43 0.4642 0.4643 C.4C63 1.2964 3.2264 2.7104 3.7564 0.4132 C.5173 C.1325 0.6766 PATTIPATE EFACT ACTUAL 23.62 53.21 15.47 29.33 164.55 25.48 4C. 1C 54.26 SAPPLE STE EEVIATION 9.4347 0.0671 0.3289 0.3214 C.3239 C.1755 0.1669 0.2044 CUPULATINE TEST TIPE 103.734 32.125 35.450 34.705 43.459 71.610 131-195 143.586 CLPLLITEVE FAILURES 13.6700 15.Geco 17.4700 14.170C 20.8466 14.4200 22.0400 22.4760



CASE 18 20 178+1

FRASE	1	2	3	4	5	4	7	
ACTLAL PAILUPE PATE	2.3666	0.3CC0	0.3600	C.300C	(.1666	6.1666	4. 7000	ç. 1696
PLANNER TEST TINE	0.5417	0.5417	0.5417	C.5417	C.7322	C-5325	C-2322	C-2322
PCG81	0.3215	0.3410	0.4689	C.3709	C.7200	0.7650	0.7526	0.7455
PRILLE PATE	7.14	20.34	36.29	23.42	2.84	12.72	7.91	7.13
SAPPLE STC CENTATION	0.1615	0.2142	C.3177	6.2027	C.351C	6.4414	0.4237	2.3505
CLPLLATINE TEST TIPE	4.554	19.586	29.490	39.508	44.204	48.475	52.744	57.039
CLPLLATINE FAILUPES	3.0306	9.5000	4-1400	13.0600	14.4166	17.5500	\$1.C3CC	23.5500

**** 11 12 11 14 14 16 ACTUAL FAILURE BATE C-4CGE 0.4000 C-4000 C.C5C0 C.C5CC c.c-ca FLARREC 1831 TIPE 0.4643 C.4063 1.2564 3.2564 1.2564 3.2964 0.4663 0.4643 MCCEL ESTIMATE C.5C77 C.4414 C-0807 0.6547 0.0641 FIRE FIRE FOR STATE 24.52 14.01 SPIFLE STC CENTATION 3.3717 0.2447 0.2312 C.2281 C.CE73 0.6250 0.0344 C. C*5C 72.051 44.549 36.6766 41.5466 CLPLLATINE FAILLAGES 33.1100 14.6300 44.62CG 47.5CCC 20.9100 29.8400



APPENDIX E

Results of Test MOD3

1. Test MOD3

Test MOD3 used the AMSAA model to estimate the failure rate of the items tested except as described below. A more detailed discussion of the modification can be found in Section V-D.

Use of the AMSAA model was modified as follows:

a. The point estimate of the failure rate,

was used whenever cumulative test time over all items was less than 10 hours.

b. The slope of the reliability growth pattern was estimated using the current point estimate, r_p , and the two previous estimates of the failure rate, \hat{r}_{i-1} and \hat{r}_{i-2} . The slope estimated was in two parts,

$$\hat{r}_{i-1}$$
 - \hat{r}_{i-2} and r_p - \hat{r}_{i-1} .

The estimate of the slope was considered increasing if both parts of the estimate were determined to be increasing as follows:

$$\hat{r}_{i-1} - \hat{r}_{i-2} \ge ,07$$

and

$$r_p - \hat{r}_{i-1} \geq .07$$
.

If the slope was increasing, the point estimate, r_p , was used as the current estimate of the failure rate. Then, the AMSAA model was reinitialized, that is, time and failures prior to an increasing slope were not considered in future estimates made by the model.

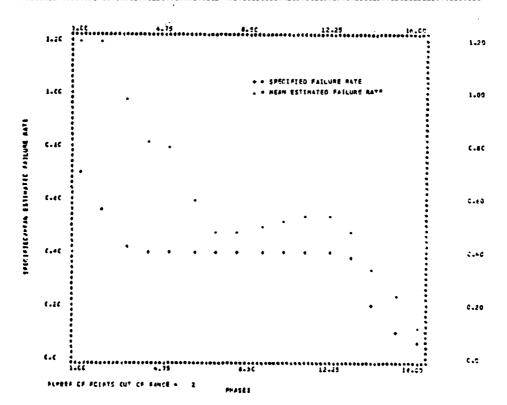
2. The Results

Results for Cases 4, 6, 15, and 18 are presented here as representative of the effect the modifications had on the performance of the model. A detailed description of the format of the results can be found in Appendix A.

GASE 4

PPASE	1	5	3	4	•	Ł	7	•
ACTUAL FAILUPE MATE	0.7000	0.550	0.4250	0.4050	6.4666	(.4(66	C.4CC8	c, 455C
PLANES TEST TIPE	0.2322	0.2555	0.3824	C-4013	C.4063	0.4643	0.40e3	6.4662
PCCEL ESTIPATE	1.3244	1.2400	0.9444	Q-6127	C.8C44	0.4645	0.4642	C.4785
RETIDATE ERACE AS REACENTAGE OF ACTUAL PAILURE PATE	89.49	134.54	132.42	100.62	161.05	\$1.55	21.CF	15.62
SAPELE STC CEVIATION	0.4578	0.7356	0.4517	C.4575	C.4637	0.5256	0.3160	C. 7567
CLPLLATIVE TEST TIPE	1.074	2.418	4-202	4.049	7.442	5.843	11.657	13.560
CUPLLATIVE FAILURES	C.4400	1.5100	2.0700	2.5100	2.5500	4.8766	5.6766	5.7766

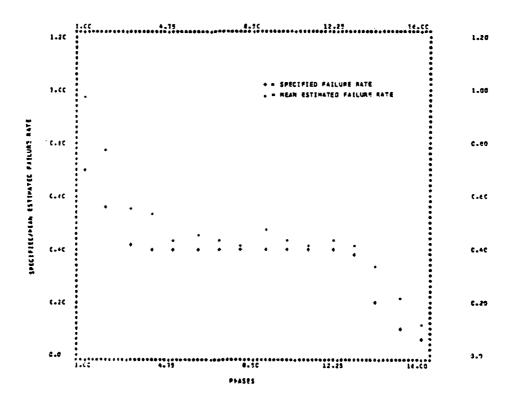
P) 1.60	•	10	11	12	13	14	1:	16
ACTUAL FAILURE MATE	C.4000	0.400	0.4600	£.4000	C.3750	C.ZCCB	C.1600	0.0500
PLANNEC TEST TIME	C-4C41	Q.4(e'3	0.4663	C-4C63	C-4334	0.8124	1.6252	3.2504
PCCEL ESTIPATE	0.5034	0.5153	0.5353	C.5432	g.4831	0.2456	C.2457	C.1275
ETTIPLIE EFECT AT PERCENTACE OF ACTUAL PAILUFE PATE	25.05	20.83	33.81	35.79	28.82	72.42	145.66	154.57
SAPPLE STC DEVIATION	0.3657	0.3214	0.3348	6.390€	6.3265	0.2252	0.2752	C.CE14
CLPLLATIVE TEST TIPE	15.442	17.319	19.166	21-049	22.075	24.840	34.226	49.304
CLPLLATINE FAILURES	4.3800	7.3000	8.0700	4.3700	1.3200	10.0060	10.6500	11.5000



CASE 4 10 ITEMS

PF451	ı	2	3	4	5	4	7	•
ACTUAL PARLUME PATE	C.7660	0.5103	0.4250	C-40,50	C.400C	0.400	C.4666	ć.4146
PLANACC TEST TIPE	0.2322	0.2555	C-3424	(.4013	C.4663	0.4(63	0.4(63	0.4567
PCCEL ES11>41E	C-9735	0.7741	0.5474	(.5432	C.4428	0.4551	0.4341	6.4716
ESTIMATE SHECK AS SERVED AS SERVED AS ACTUAL PAILURE FATE	39.13	41.11	33.50	34.13	10.71	12.77	4.17	1.40
SAPPLE STC CEVIATION	G.4C85	0.5434	0.3215	(.5243	G.2595	0.2514	C.2879	c. 22cs
CLPLLATINE TEST TIPE	2.134	4.887	8.462	12-133	15.443	15.423	23.410	27.195
CLPLESTINE FAILURES	1.5400	2.9400	4.1400	2.8600	7.3100	8 - 44CG	10.1000	11.2400

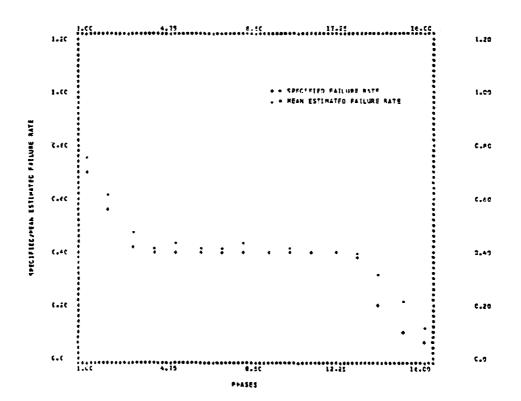
****	1	10	11	12	13	14	15	10
ACTUAL PAILURE RATE	C.4000	0.4000	C-4C00	C-400C	C.375C	0.2000	C.1000	0.0100
FLANNEC TEST TIPE	0.4663	0.4663	0.4663	C.4063	0.4234	C.&12e	1.4222	3.2504
PCGEL ESTEPATE	0.4859	0.4354	0.4195	0.4398	6.4265	0.3431	C.227e	C-1765
ESTIDATE EFACE AS SERCEDTACE OF ACTUAL FAILURE FATE	21.47	5.64	4.67	9.94	13.63	71.66	127.63	192.55
SAPPLE STC CEVENTION	0.3573	0.2:38	C-2260	C.2441	C-1572	0.1564	C.0538	0.0404
CLPLEATINE TEST TIPE	30.943	34.723	34.459	42-187	46-178	51.427	68.565	48.301
CLPLESTIVE FAILURES	13.0700	14.3100	16.0100	17.5700	19.1400	20.8000	22 -3600	23.5370



CASE 4 20 17E+5

F14!!	1	2	3	•	5	ŧ	7	4
ACTUAL FAILUPE FATE	6./606	0.5:09	0.4250	C.4050	0.4006	0.400	C.4600	0.400
FLAPAGE TEST TIPE	4.2322	0.2523	0.3824	C.4013	C-4C43	0.4043	C.4Ce3	ò. •ce*
PCCEL ESTIMATE	0.7576	0.6289	0.4737	C.4292	C-4344	0.4254	0.4123	G-43°C
ETTIMITE EFFCR AS PERCEPTACE OF ACTUAL PALLUFE RITE	£-23	14-25	11 -47	5.94	£.71	7.15	3.03	€.25
SAPFLÉ STE CENTATION	0-4180	0.3148	0.2445	6.2077	C-2363	0.2092	0.1562	C. 1784
CLPLLSTIVE TEST TIPE	4.313	9.754	14.474	24.303	21.794	35.227	46.759	
CLPULATINE FAILUPES	2.9100	5.8400	8.6100	11.7100	14.7100	17.7600	20.8300	24.(300

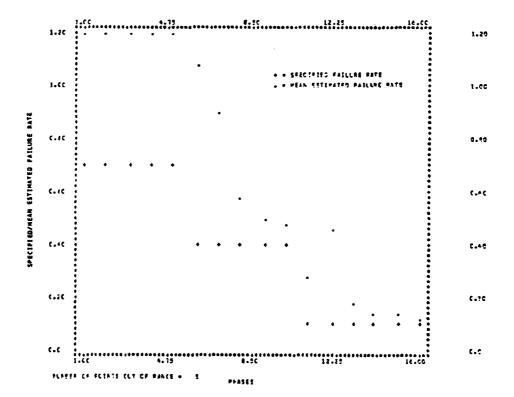
F>4:5	•	10	11	12	13	14	1:	16
SCTLAL FAILUPE PATE	C-4CCC	0.4600	0.4666	C-4006	C.375C	0.2000	C.10CG	0.0400
PLAPAGE TEST TIPE	G.4C63	0.4663	0.4663	C-4043	C.4334	C-Elic	1.4252	3.2104
PCCEL ESTEPATE	0.4694	0.4167	0.3536	(.3958	6.3913	G-31C4	C.21?3	C. 1266
ESTIDATE ERROR AS BERCEPTACE OF ACTUAL PABLURE PATE	2.39	4-17	1.55	1.04	4.24	55.11	115-25	152.63
SAPPLE STC CEVIATION	0.1432	J.lecc	0.1242	C.1137	C-1154	0.0559	C.CEE7	0.0496
CLPLLATIVE TEST TIME	£1.676	69-123	76.672	64-172	52.154	167.154	137-320	197.432
CLPLLATINE FAILUPES	27.0468	30.2200	33.2300	26.1700	15.0600	42.GECG	44.EGCC	47.6000



CASE 4

PPASE	1	2	3	•	5	•	1	•
ACTUAL FAILURE RATE	C.7C00	0.700	0.7030	C.7000	C.700C	0.4566	C.4CCC	Ç.40G0
BEALT TEST TERE	0.2122	0.2372	0.2322	C.2322	C.2322	4.4663	G.4Ce3	C.4(63
PCCEL SSTEMATE	1.3652	1.4414	1.3724	1.4248	1.3555	1.0410	0.9029	0.5731
PERCENTAGE OF ACTUAL PAILUFE THE	95.03	105.51	94.11	103.54	13.44	176.24	125.72	43.27
SAPPLE STC CENTATION	0.6434	0.8:25	0.7410	C.7812	C.4901	0.7164	0.4755	C.2<85
CUPLLATINE TEST TIPE	1.661	2.128	3.209	4.305	1.374	7.216	5.2075	10.548
CLPLISTIVE FAILLFES	0.7400	1.4500	2.2200	2.8400	1.5500	4.4366	5.2961	e. C1 CC

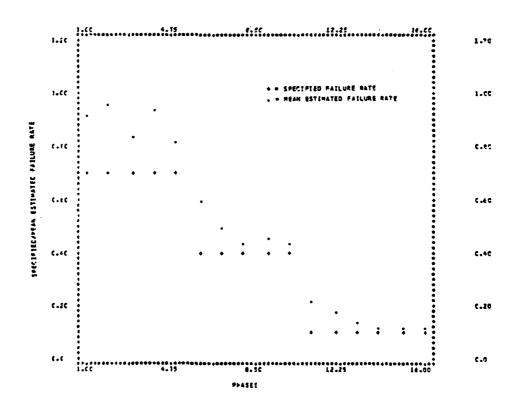
PP#12 10 11 12 13 14 15 SCTUSE PAILURE MATE C.4CCC 0.4000 0.1000 C.1000 C-1000 0.1600 G.1CCC C-1000 1.6252 FLAFFEC TEST TIPE 0.4063 0.4(23 1.6252 1.4252 1.6252 1.6252 1.6252 PCCEL ESTIMATE 0.5058 0.4751 0.2701 C.4624 C.1733 0.1458 C.1340 0.1231 ESTIMATE EFECT AS PERCENTAGE OF ACTUAL PAILURE FATE 27.46 73.25 45.78 22.54 18.17 170.15 142.37 23.58 8-1651 C.6751 SAPELE STC CEVIATION 0.2716 0.2446 0.1674 2.5930 C.1390 C. C:45 14.742 CLACESTINE TEST TIPE 12.656 22.241 29.722 37.201 44.676 CLPLLATIVE FAILLRES 0.6800 7.3800 7.9800 €.9300 5.7000 18.4000 11.3000 12.1500



CASE 6

PF#5E	1	\$	2	•	5	ŧ	7	•
ACTUAL PAILLPS MATE	0.7COC	0.7666	6.7000	C.7300	C.700C	0.4000	C.46CG	G.4566
PLANNEC TEST TIPE	0.2322	0.2355	0.2322	6.2322	0-5355	G.4C42	E.4C6?	C.4C67
PCCEL	0.9152	0.4550	0.8363	C.9337	C.8284	G.4Ce1	0.5078	0.4483
RETIPATE ERACE AS RESCENTAGE OF ACTUAL PASSURE RATE	21.32	37.CO	19.48	33.34	18.37	51.53	26.95	12.ce
SAPPLE STC CEVIATION	C.5C75	0.5522	0.4667	C.4841	(.4354	0.2061	C.3347	C-2144
CLPLLATIVE TEST TIPE	2, 158	4.217	6.441	4.553	10.725	14.459	16.267	22.653
CLPLLITIVE FILURES	1.3500	3.0103	4.3360	1.520C	7.1800	8.44CC	5.4100	11.2500

**#58 10 11 12 13 14 15 16 C.400C C.1CCG 0.1000 ACTUAL PAILLIFE BATE 0.4000 C.1 CGC C.1000 C-1CCC 0.1000 1.6252 1.4252 G.11C7 0.4653 0.4462 0.2259 C-1702 0.1266 C.1426 0.1167 ESTIMATE ERFCR AS PERCEPTAGE OF ACTUAL PAILURE PATE 17.32 11.54 24.58 16.76 125.55 7C.15 42.43 14.68 SANFLE STE ERVIATION 0.2712 0.2154 C-C517 0.0458 C.C257 0.0504 C.GEZE 74.436 115.3CE CLPLLATINE TEST TIPE 25.431 29.165 104. 111 12.7500 14-1500 15.740C 11.4500 15.0200 4C.56C0 27.1 ECC CLPLLATINE FAILURES



CASE 6

P+41{	1	2	3	•	5	•	7	
ACTUAL PATLURE MATE	0.7600	0.7660	C.7000	(.7000	0.7000	0.4000	C.40CC	p.4500
# 1 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	0.2323	0.2372	0.2322	C.2322	C+2322	6.4643	0.4663	C.4C63
PCCEL ESTIPATE	6-7251	0.4111	0.7428	C.7842	C.7194	0.5240	0.4616	C.4526
PROCESTS PROCESS OF ACTUAL PROCESS OF ACTUAL	3.54	15.24	11.63	. 12-02	Z.#2	31.49	19,29	13.40
SAPPLE STC CENTATION	g.4CE7	0.4161	C.3489	C.3554	6.3222	C-2121	0.1617	C-16C4
CLPLLATIVE TEST TIPE	4.254	8.561	12.642	17.130	21.419	28.505	34.410	43.834
CLALLATINE FAILLAGES	2.7700	4.0100	4.2000	12.3000	11-2166	17-4566	21.0200	24.3000

12 1: 16 #C71#1 ##111# ##18 C-4CCC 0.4000 0.1000 C.1CCC C.1020 0.1000 C.100C C.100C PLAPACC .TEST TEPE C-4C43 0.4(23 1.6252 1.4252 1-4252 1.0252 1.6292 1.6252 PCCEL ESTIPATE 0-4173 0.4176 0.2115 C-1407 C-1336 C-1141 0.1081 7-1005 4.23 4.39 111.53 40.74 . 33.64 IE.CA £. C5 C.54 SAPPLE STE CEVIATION 0.1407 0.1426 0.0741 C.0457 0,0335 C. (273 0.0225 C. C2C4

88.414

33-1700

116-457

36.4600

146.455

15.4366

176.519

42.3!CC

206.945

CUPULATINE TEST TIPE

CLACGATINE FAILURES

51-373

27.3300

58.854

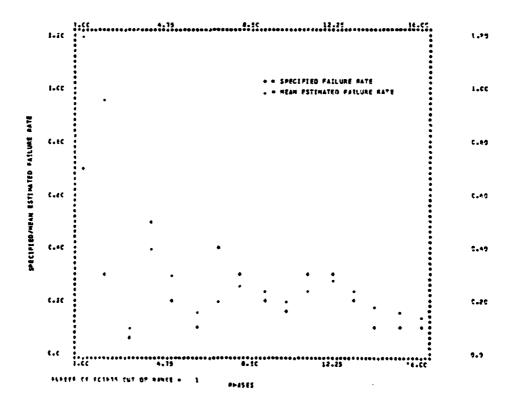
30.0403

PH4525

5 178PE

PASS	1	2	3	4	1	4	7	•
ACTUAL PATLUPE MATE	C.7C00	0.3666	C.0100	C.20CC	(-3000	0.1000	0.4000	4.3CCC
PLARACE TEST TIPE	0.2322	0.5417	3.2504	C.3750	C-0124	1.4252	C.4Ce?	C. 1417
PCGEL ESTIPATE	1.5230	0.5539	0.1074	6.4027	C-2542	6.1274	0.1524	C.2615
PATILIFE PATE	117.57	217.57	114.79	19.47	47.10	57.46	51.69	12.76
SAPPLE STC CEVIATICA	1.0053	0.4239	C.1107	C.7464	C.2642	6-1725	C.1868	3.3440
CUPULATINE TEST TIPE	1.074	3.:73	18-461	14.990	23.722	31.229	32.112	35.575
CLPLLATINE PAILURES	C.75CC	1.5200	2.2500	2.950C	3.73GC	4.45CC	5.0700	5.5366

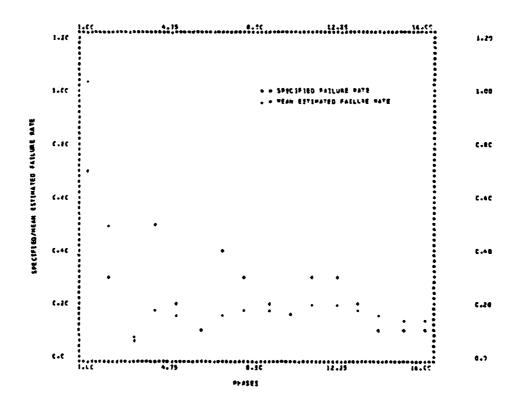
11 12 13 **** 10 14 19 14 0.3000 ACTUAL FAILURE FATE C-2000 0.1500 C.3000 2335.3 C.1CCC 0-1GCC C.1CCC PLANAC TEST TIPE C-8124 1.0835 0.5417 C-5417 Č-8126 1.6252 0.2454 C.2727 C-2405 0.1834 PCCEL ESTEPATE 0.1516 0.2333 0.1528 C.1314 PENCENTICE PRICE LOTCAL 14.43 24.51 14-13 5.05 26.47 £3.4C 51.75 31.42 SAPPLE, STC CEVEATION 0.2561 C.276E (.2455 0.1255 C.C557 0.2264 0.1416 0.CE11 CLPLLATIVE 1951 TIPE 39.351 44.288 46.784 49.254 :3.00: 46.464 46.047 75.125 CLPLLATINE PAILLAFS 6-5100 7.2200 8.3100 5-100C 5.2100 16.7166 11.3500 11.5500



CASE 15

PHASE	1	2	3	•	5	•	1	
ACTUAL FAILURE RATE	C.763g	0.3000	0.0106	C.500C	C.2000	0.1668	0.4000	9.158C
1417 1231 384443	C-2322	9.5417	3.2504	(.3250	C.8124	1.4252	6.4643	Č.\$417
PCCEL ESTIPATE	1.0392	0.5001	0.0443	C.1876	C.1503	0.1072	6.1500	0.1721
RITIDATE ERRCR AS BIRCESTAGE OF ACTUAL PASSURE FATE	40.44	45.34	44.43	62.49	24.85	1.16	12.49	42.64
SAPELE STE GEVENTICA	0.5288	0.3624	0.1227	C-3933	C.1445	0.6416	0.1125	0.1127
CLALCALINE LEEL LINE	2.104	7.043	37.101	40.105	47.404	42.174	44.364	71.262
CUPLLATIVE FAILLAGES	1.7700	3.3100	4-8500	4.3500	1.4266	5.34CQ	10.5869	12.5905

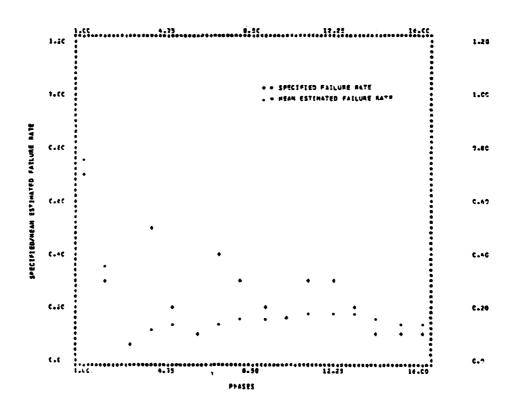
P>45E 10 11 12 13 14 15 10 SCTUSE FATLURE RATE c.zccc C.300C 6.1000 C.1000 6.1500 C.3000 C.2000 0.1000 PLANNER TEST TIME 1.4722 C-8124 1.0625 0.5417 6.5417 C.612e 1.4252 1.4757 C-1 #01 0.1444 0-1405 C.1961 C.1861 43:1.0 C.1447 0.1110 9.52 16.53 33.45 33.44 4.54 56.20 44.71 22.61 0.0521 SAPPLE STE CEVIATION 0.1109 C.1275 0.1424 0.1573 C.C857 0.0466 3.C47? CUPALITINE TEST TIPE 78.708 88.725 93.707 18.702 104.248 121.205 124.257 CLPLLATIVE FAILURES 13.000C 15.57CC 17.18CC 16.4600 26.1106 21.44CC 23.2900 24.67CC



CASE 15 20 178>1

PPASE	1	2	3	•	5	•	7	4
ACTUAL PAILUPE MATE	C. 7686	0.3666	6.0500	C.5000	6.2666	6.1060	8.4000	ç. vcc
PLANNEC TEST TIPE	0-2323	0.5417	3.2:04	C.325C	C-8124	1.4252	6.4643	0.1417
PCCEL ESTIPATE	0.7422	0.3512	0.0627	6.1195	(-1347	Ø.1C45	0.1424	0.1673
BERCEPTIES CF ACTUAL PAILUE FATE	4.45	17.05	25.32	74.02	11.44	4.54	44.15	44.22
SAPPLE STC CEVEATICY	C.42G5	0.1502	0.0377	C.2004	C-1001	0.6469	0.0840	0.0504
CLPLLATINE TEST TIPE	4.272	14.266	74-044	10.094	45.034	124.511	137.144	142.276
CLPLLATIVE FAILLRES	2.9500	5.8500	9.0006	11.7600	14.8800	18.0300	21.3200	24.43GC

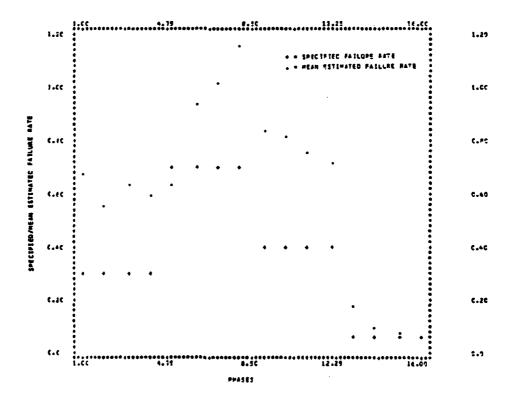
P+158 16 11 12 13 14 19 16 ACTUAL PAILURE MATE 0.2000 0.1500 0.3600 €.300€ C-5CGC 6-1CCG 0.100 C-ICCC PLANNEC TEST TIPE 0.8124 1.6835 0.5417 6.5417 C.6124 1.4252 1-4252 1. 629. PCOEL ESTIPATE 0.1452 0.1573 0.1769 0.1864 C-1865 0.1642 C-1475 C-137C SET IPATE CEPTCE CELLL 15.41 4.65 41.65 37.19 4.55 47.43 31.64 SAPPLE STC CEVENTICA 0.0516 G. CeCa 0.0494 C. C483 C.C414 0-6454 0.0343 0.0320 CLPLLATIVE TEST TIPE 157.243 177.242 187.247 157.196 212-154 242.173 272.258 302-356 CLPLLATIVE FAILURES 27.4000 30.4360 33.4100 14.0400 15.41CC 42.6600 45.4400 46.4700



CASE 18

99458	1	2	3	4	5	•	7	•
ACTUAL PAILUPE PATE	C.3C0G	0.3000	0.3000	C.3000	C.106C	g.1CC0	0.700	9.1000
PLAPAGE TEST TIPE	0.5417	0.5417	0.5417	C.54L7	(-2322	C.2122	0-5353	0.2727
PCCEL	0.4454	0.5467	0.4452	(.5939	C.4399	0.5478	1.6787	1.3**
PATTOLYE ERRCR AS	128.55	88.10	115.04	97.97	8.59	25.40	46.56	45.44
SAPPLE STC CEVENTION	C.3824	0.3611	0.3477	C-4844	C.7454	0-6715	0.7523	C. 8653
CLPLLATINE TEST TIPE	2.505	5.042	7.507	16.020	11.114	12.158	12.223	14.244
CLPLLATINE FAILLAS!	8.710C	1.4200	2.260C	2-9000	1.4200	4.47C0	5.03CC	5.5100

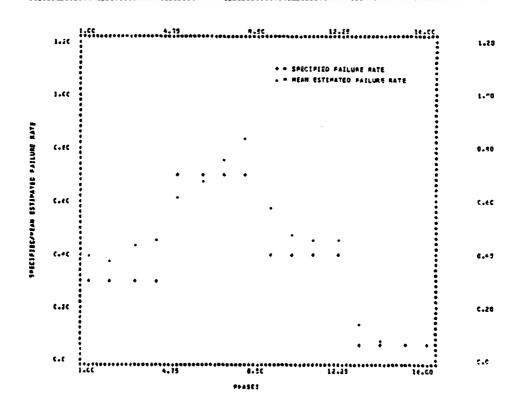
FFASS • 10 11 12 13 14 14 ACTUAL FAILURE NATE 0.4660 C.4CCC 8.4CGC C-400G C-0500 G.CSCC 0.0500 0.0501 PLAPPEC 1851 TIPE C.4C63 0.4663 0.4663 3.7564 3.2564 0.4043 3.2564 3.2564 PCCEL ESTIPATE 0.4375 0.8254 0.7519 6.7233 0.1743 C-1CC9 0.0764 G. CéC4 PATTE PROCESTAL 109.37 107.36 47.58 £0.82 248.68 101.05 !t.Et 26.87 SAPELE STE CEVIATION 0.6794 0.4464 0.4110 C.5380 C.1542 0.0459 0.0513 C.C262 CLALLATINE TEST TIME 14-144 14.057 19.541 21.604 36.745 \$1.570 47-164 82.335 CUPLLATIVE PATLURES 6.8 200 7.5160 8.2760 4.9800 1.5200 10.4800 11.2000 11.5100



CASE 18

JIA4#	1	2	7	4		4	7	4
ACTUAL PAILUPE MATE	C.3CCC	0.3000	0.3666	(.3666	C.10GC	6.1066	0.7060	p.7cae
3417 7237 3344614	0.5417	0.5417	0.5417	6.9417	C-2322	6.7232	C.2322	6.8322
PCC1L #571PA78	0.4691	0.3416	0.4460	C.4523	C-4225	0.6765	C.765C	0.6227
ESTIPATE EFFCA AS BEGCENTACE OF ACTUAL PARLUPE PATE	24.26	27.19	48.68	10.77	11-07	2.21	5.64	14-16
SAPSLE STC CEVEATICK	0.2150	0.2124	C.3171	C-2549	C-4405	0.4153	9.5224	0.4772
CLPLLATIVE TEST TIPE	4.527	9.532	14.858	19.747	21.905	24.641	26.213	28.341
CLALLATINE FAILURES	1.5500	3.0466	4.7600	4.5600	1.5766	5.1400	10.4600	12.4700

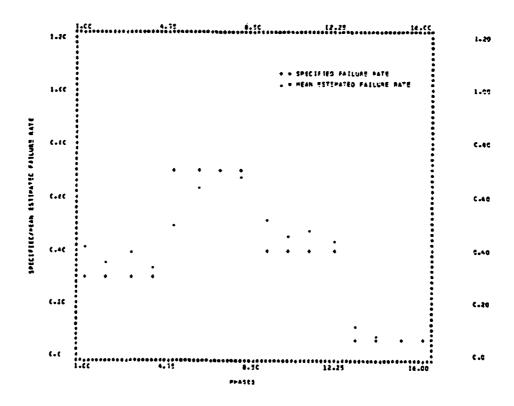
Pratt 10 11 12 13 14 1: 14 SCTUSE PATLLAG RATE C.4CQC 0.4000 4.4000 C-4000 C.C500 0.0:00 C.C:CC 0.4043 PLANNEC TEST TIPE 1.2964 2.2504 3.2504 0.4643 0.4643 C.4043 3.2564 PCDEL ESTIPATE 0.5821 0.4701 0.4579 C-4509 0.1327 0.(862 0.0674 0.0186 BETTEPATE ERRCA CTURE 45.54 12.74 145.48 72.45 14.46 SUPPLE STC CENTATION 0.3305 0.1658 0.2651 C-2147 C.CEZE 0.(145 CLPLLATINE TEST TIPE 32.129 35.550 15.0€00 CLPLEATINE FAILURES 13.8200 14.4866 12.2100 77. E7CC 14.5500 18.0730 26.6460



CASE 18 20 11891

1	1	3	4	5	•	1	•
6.3000	0.300	0.3040	(.3006	Ç.1060	333:.3	C.1666	ç.1c 0c
0.5417	0.5417	0.5417	6.5417	C.2322	C.2322	C.2322	C.2122
C.4185	0.3443	0.3417	C.3462	C.4536	0.4321	C.4954	3.6862
39.45	21.43	30.54	13.35	25.45	5.70	6.00	1.54
C.2505	0.2166	0-3011	C.1419	C.295C	6-3143	C.3542	C. 3776
9.554	19.584	25.490	35.508	44.204	48.475	57.744	57.035
3.0366	5.9000	4.14GC	12.0400	14.5466	14.1200	23.0200	73.4500
	0.5417 C.4185 39.49 C.2505	C.3CCC 0.3CCO 0.5417 0.9417 C.4185 0.3443 39.45 21.43 C.2505 0.2188	C.3CCC	C.3COC 0.3CCO 0.3000 C.3000 0.5417 0.5417 0.5417 C.5417 C.4185 0.3443 0.3517 C.3442 39.45 21.43 30.54 12.35 C.2505 0.2188 0.3C11 C.1415	G.3COC 0.3CCO 0.30G0 C.30G0 C.10G0 0.5417 0.9417 0.5417 C.5417 C.2322 G.4185 0.3443 0.3517 C.3462 C.4536 39.45 21.43 30.58 13.35 25.45 C.2505 0.2188 0.3C11 C.1615 C.299C	G.3COC 0.3CC0 0.3000 C.3000 C.1000 C.1CCC 0.5417 0.5417 0.5417 C.5417 C.2322 C.2322 C.4534 0.4321 39.49 21.43 30.54 12.35 25.45 5.76 C.2505 0.2148 0.3C11 C.1614 C.295C C.3143 9.554 19.554 14.204 45.475	G.3COC 0.3CCO 0.3000 C.3000 C.10E0 C.7CCC C.7CCC 0.5417 0.5417 0.5417 C.5417 C.2322 C.

**** LZ 13 14 1: 14 11 SCTUSE FAILURE MATE 3.2564 PLANAGE 1837 TIME 0.4643 0.4663 3.2504 1.2504 C-4 C63 C.4043 3.2564 PCGEL ESTIPATE 0.5218 0.4624 0.4641 C-1297 C. (754 0.0642 0.0553 PERCENTAGE CF ACTUAL 21.53 56.65 SAPELE STE CENTATION 0.2717 0.2251 0.2255 C-1740 C.C792 0.0241 0.0242 C.C162 CLPLLATENE TEST TIPE 72.051 CLPLLATINE FAILLESS 26.9100 29.8400 14.0300 14.9CCC 44.4200 33.1100 41.5400



APPENDIX F

Results of Test MOD4

1. Test MOD4

Test MOD4 used the AMSAA model to estimate the failure rate of the items tested except as described below. A more detailed discussion of the modification can be found in Section V-D.

Use of the AMSAA model was modified as follows:

a. The point estimate of the failure rate,

was used whenever cumulative test time over all items was less than 10 hours.

b. The slope of the reliability growth pattern was estimated using the current point estimate, r_p , and the previous estimates of the failure rate, \hat{r}_{i-1} and \hat{r}_{i-2} . The slope estimated was in two parts,

$$\hat{\mathbf{r}}_{i-1}$$
 - $\hat{\mathbf{r}}_{i-2}$ and \mathbf{r}_{p} - $\hat{\mathbf{r}}_{i-1}$

The estimate of the slope was considered increasing if both parts of the estimate were determined to be increasing as follows:

$$\hat{r}_{i-1} - \hat{r}_{i-2} \geq .2\hat{r}_{i-2}$$

and

$$r_p - \hat{r}_{i-1} \geq .2\hat{r}_{i-1}$$

If the slope was increasing, the point estimate, r_p , was used as the current estimate of the failure rate. Then, the AMSAA model was reinitialized, that is, time and failures prior to an increasing slope were not considered in future estimates made by the model.

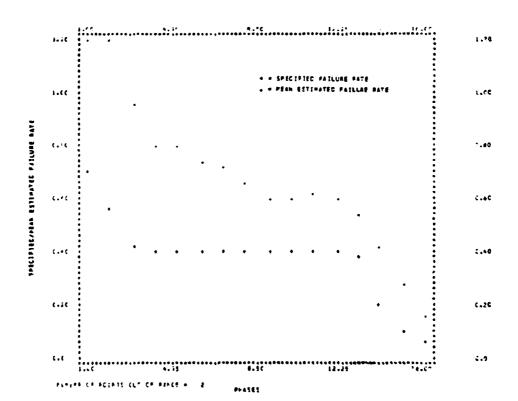
2. The Results

Results for Cases 4, 6, 15, and 18 are presented here as representative of the effect the modifications had on the performance of the model. A detailed description of the format of the results can be found in Appendix A.

5 17825

56454	1	3	2	•	5	4	,	•
ACTUAL PATLLRE BATE	C.1CCC	0.5:07	0.4250	C-405C	C-4666	6.4566	C.4620	9.4230
*14++66 1621 11+6	C.5355	0.2555	0.3824	C.401?	C.4C43	C.4662	0.4263	0.4563
*CCEL #271947E	1.3244	1.3160	C.9675	C.8775	C.EC67	8.744C	5.715e	7.4554
BITIDATE PARCE AS BIACESTACE OF ACTUAL PASSIBLE BATE	85.45	139.74	127-44	59.37	101.48	10.01	15.65	ez.4e
SAPPLE STE CEVIATION	C.4578	C. 1415	C.6545	C-4593	C.4e55	0.4814	0.5557	C.4663
CLALLATINE TEST TIME	1.074	2.418	4-202	4.649	7.942	4.642	11.697	13.500
CLPLEFTINE FAILURES	C.44C6	1.42((2.0566	1.8900	3.1500	4.1166	5.0466	5.7766

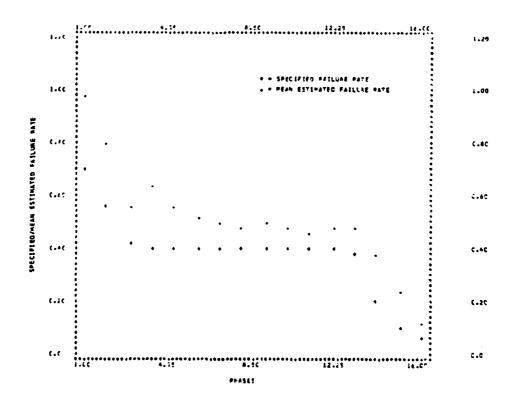
11 12 1: 10 13 ié *** 15 ACTUAL PAILURE MATE C.4CCC 0.4003 0.4600 C.4000 0.7750 €.2000 C-1000 0.0500 #44##EC 1881 11#E 0.4563 0.4(63 C.4963 C.4334 · C.8124 0.6177 0.2700 PCCEL ESTIMATE C-6C16 0.4615 C.5977 C.5446 C.412C 0.1922 50.41 50.27 54.43 45.43 45.24 104.61 110.01 2Ce.4e SIPPLE STE CENTATION C.3634 C.2573 2.2677 0.3664 0.2162 C-3770 C.34C¢ C.1427 CUPCLETINE TEST TIPE 12.442 17.315 15.186 21.045 23.075 24.640 24.374 49.764 4.0000 £.6900 1.23CC 1C.C1CG 1C.85C0 11.64CC CLPELITINE PAILLESS a.54GC 7.14C2



CASE 4

F>4:E	1	2	3	4	9	é	7	•
SCILEL FEILLEE MATE	C.7560	0.5:03	0.4250	C.+050	C.4086	C.4CCE	C.4CCG	0.4635
PLAPARC 1857 TIPE	6.2322	0.2155	0.3624	C.4013	C.4C63	0.4043	0.4043	C.4(e?
PCCEL ESTEPATE "	C.9735	0.7546	0.5631	C-6317	C.5626	C.51C3	0.4937	0.4734
PATILIZE ZATE	35.13	44.48	32.50	11.51	40.45	27.55	23.41	16.35
SAPPLE STE CEVIATION	G.6(85	0.5476	C.33C5	(.6257	C.4715	0.3324	9:55.0	C.730e
CLALLATINE TEST TIME	2.134	4.667	8.46ž	12.133	19.003	15.423	23.410	>7.195
CLPLLATINE FAILLFES	1.5400	2.8:03	4.1100	5.9000	7.2166	8.64CG	10.1000	11.2766

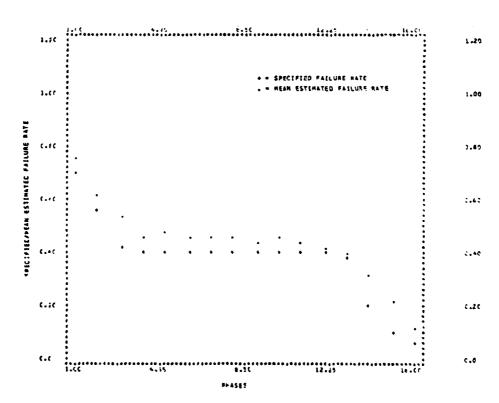
*>418	\$	10	11	12	13	14	l:	lé
SCTUSE FAILUSE MATE	3334.3	3.4663	9.4609	C.420C	C.375G	6.3063	6.1500	C. C500
FLARAGE TEST TIME	0.4063	0.4(43	C.4C63	C-4963	E.4234 -		1.6252	3.2104
PCCEL ESTIPATE	C.4554	0.47,19	0.4653	£.4749	C.4861	0.37e3	C,23e0	0.128e
ETTINITE EFFCE SE FERCENTICE OF SCHIEL FAILLE EATE	23.65	17,57	17.32	18.74	15.64	66.13	111.56	151.25
SEPFLE STC CEVERTICS	0.2722	0.2949	C.2628	C.2450	6.2446	6.2163	0.1033	0.6447
CLPLLATINE TEST TIPE	30.543	34.723	38.459	42.187	46.178	52.627	et.585	58.301
CUPLLATINE FAILUPES	13.0700	14.4500	14.0100	17.5700	14.1ecc	;C.eccc	22.3400	23.5300



CASE 4

eb12ā	ı	3	2	4	5	e	7	
ACTUAL SAILURE PATE	C.7630	9.5463	C.425C	C.405C	C.40GC	6.4000	C-4CCC	9.4006
FLANDEC TEST TIPE	6.2372	0.2555	0.3624	C.4013	C.4Ce3	0.4Ce3	C.4563	C.4C62
*CCEL #511*4"5	C.757e	0.4134	0.5322	C.4618	C.4765	C.4524	0.4506	G.4ep7
ESTIMATE FRACE AS SERCEPTACE OF ACTUAL FRILLES FRACE	£.23	11.52	25.22	14.02	17.63	12.65	12.64	17.16
SAPPLE STE CEVIATION	C.41EG	0.3452	0.3633	(.2545	C-2521	C.22C5	C.1825	0.1866
(L+LL&*)\& 1851 11>&	4.212	9.756	14.674	24.303	21.756	25.327	44.755	94.788
CUPLLATINE SATIUATE	2.6500	5.8466	8.87C0	31.7100	14.7166	17.7666	20.0300	74-C70G

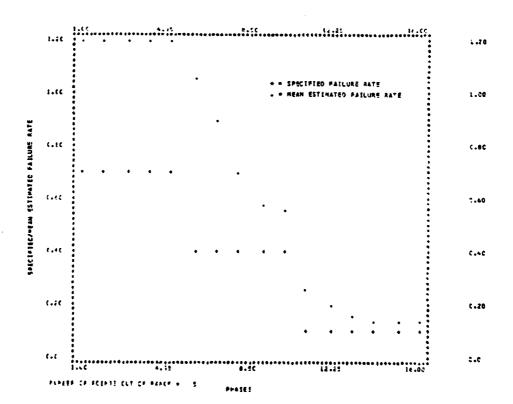
#>#{E	٢	1¢	11	12	13	14	15	16
ACTUAL FAILUFE FATE	C.4C3C	0.4666	0.4000	C-4006	C.275C	C.2CC6	C-1000	0.0500
SAIF TEST SEARES	C.4C63	0.4663	0.4663	C.4063	C-4334	C.8126	1.6252	3.2504
>CCEL #51;>4'E	0.4276	0.4264	C.4331	C.4219	C.408E	0.3258	G-2192	C-12e2
ESTINATE ERRCE AS THE CANTES OF ACTUAL FAILURE FRIE	5.40	12.55	9.26	5.47	5.02	64.53	115.21	156.45
SEPPLE STO CENTATION	C-1475	0.1:65	0.1364	C-1205	(-1133	0.0867	G.Ce46	C-C387
CL-CLATIVE TEST TIPE	el.e78	69.132	76.672	£4.172	92.154	167.154	131.320	157.432
CLPLLETINE FEILLRES	27.0466	30.5360	33.2300	:e.170G	25.C60G	42.0406	44.6000	47.6060



CASE 6

86458	1	2	3	4	9	4	7	
ACTUAL FAILURE PATE	6.7000	0.1666	C.7C00	C.1000	C.1000	6.4066	C.4GCG	C.4COC
FLAPAEC TEST TIPE	0.232?	0.2227	5557.0	2562.3	C.2222	C-4C63	C.4Ce3	0.4Ce3
PCCEL ESTE-47E	1.2452	1.4565	1.3729	1.4042	1.2352	1.000	C.4C46	C.7C39
PARTIE ERRCH ALL	45.03	108.24	56.28	100.61	SC .74	144.51	126.le	72.66
SAPPLE STC CEVIATION	C.4434	C.8648	0.7531	(.7e01	C-6851	0.7145	0.4319	9-4647
CLPLLATIVE TEST TIPE	1.Cel	2.126	3.209	4.305	1.374	7.210	4.675	10.546
CLOLLATINE FAILURES	6.7466	1.4100	2.1100	2.8400	3.2500	4.4466	5.18CE	6.0190

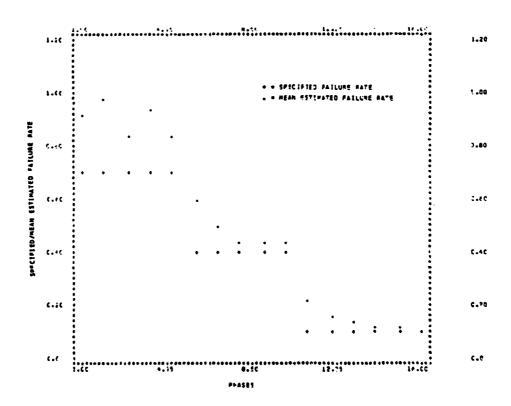
11 10 12 12 15 ACTUAL PATILLEE BATE C.4CCC 0.4660 0.1003 0.1900 C-1 CCC c. • ccc FLARREC 1551 TIPE C.4C63 0.4663 1.6252 1.6252 1.6252 1.6252 1.6252 *CCEL ESTIMATE C.567C 0.5612 0.2547 C-1974 C-1613 C.14C7 0.1387 0.1356 ESTIMATE EFFCE AS FERCESTAGE OF ACTUAL FRILLIA LATE 46.75 40.30 154.71 47.37 61.23 28.75 35.15 46.72 SEASE STC CENTATION 0.0177 0.3553 2.4326 0.1452 C.1285 C.C865 C.C821 0.1032 COLLITIVE TEST TIPE 12.856 14.742 22.241 25.772 27.201 44.676 52.544 55.573 CLPELATINE FAILURES e.6800 7.3800 7.9800 E.5000 4.7000 10.4000 11.3000 12.1500



CASE 4

#####	ı	2	3	•	\$	ŧ	7	•
ACTUAL PARLUPE RATE	6.7666	0.7663	6.7600	C. 70CC	C.10CC	0.4CCC	C.4CCC	Ç.4CG?
FLAPAGE TEST TIPE	0.2523	0.2122	6.2322	C.2322	(.2322	0.4643	2.4662	C.4Ce3
*CCEL ESTI-ATE	C.9145	0.5763	0.4404	(.9337	C-6485	0.5553	0.5030	C.4403
RETIFETE EFFCE AS BEACEPTEEL PRILLER FATE	21.22	36.4?	23.65	12.24	21-21	46.62	19.76	16.67
SIPPLE STE CENTATION	0.5675	0.552?	C.4G44	C-4P41	€.452€	C.1527	C.2424	C.215C
CLASSATINE TEST TIME	2.15E	4.277	4.441	4.552	16.724	14.455	14.267	22.(43
CLPLLATINE FAILURES	1.3500	2.9:60	4.310C	5.9200	7.1000	8.6666	\$.58CC	11.2950

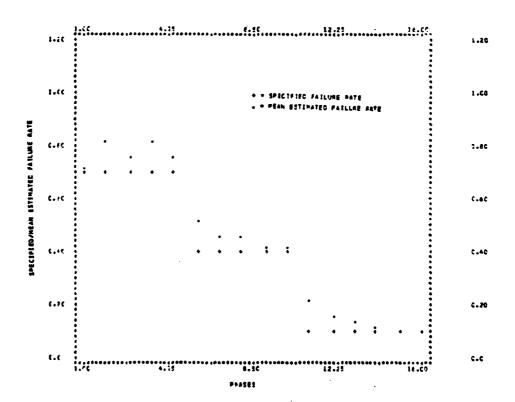
FFASE	9	fc	11	l Z	13	14	l!	16
ACTUAL FAILURE MATE	C.4CCC	0.4660	0.1000	C.1006	C.100C	0.1000	G.1CCC	C.1CCC
3417 F28F 3144833	C.4Ce?	0.4642	1.4252	1.4252	1.4252	1.6252	1.6252	1.6393
+CCEL #571-478	0.4457	0.4368	0.2285	C.1044	(.1431	6.1140	C-11 :5	0.:098
##7]P#7] ###C# ## ###C#PT#C# ## #CTL#L ##[LIFE F#1E	12.42	7.71	128.44	64.57	40.12	24.C1	12.51	5.77
TAPPLE STC CEVENTION	2.2474	9.1931	0.1024	C.0577	C.C493	0.0446	0.0360	0.0771
CLPLLATINE TEST TIPE	25.821	25.165	44.552	25.418	74.438	85.320	104.331	115.206
CLPLLATINE PAILUPES	12.750C	14.1567	15.7eGC	17.4500	15.0200	20.5800	22.1600	23.740C



CASE 6

FFESE	t	2	3	4	5	ŧ	7	ŧ
4C71.31 F4321.FF 9A7E	C. 75GC	0.7666		6.7200	(.1cgE	6.4660	C.4CCC	Ç.4CCC
BLANDSC TEST TIPE	C.2112	0.21:2	C.2322	(.2322	C.2322	C.4CE3	0.4063	0.4663
PCCEL #111#476	C.72!L	0-8171	0.7419	C.8144	(.7683	0.5247	0.4575	C.4586
ESTIDATE ERECA AS SERCEPTACE OF ACTUAL FAILUFE FAIR	3.50	16.72	8.84	14.37	1.76	21.14	14.4E	14.64
SAPPLE STC CEVENTICA	C.4C87	0.4678	0.4644	C.4183	C-3747	0.2254	C-1844	0.1675
CLPLLATINE TEST TIPS	4.254	4.5el	12.842	17-136	21.415	28.505	36.410	43.631
CLPLLATIVE FAILLMES	2.7100	4.000	9.2600	12.3000	19.2100	18.9766	21.0200	24. !CCC

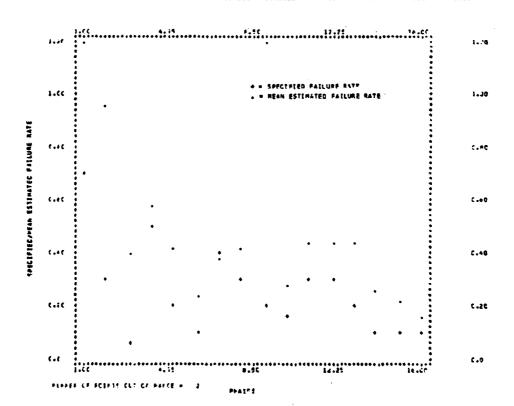
**458 ıc 12 `13 15 16 11 24 ACTUAL PAILURE BATE 0.4666 G.1300 0.1000 C.4CCC C.1000 C.LCCC C.ICGC 0.1666 FLARREC TEST TIPE 1.4252 1.6252 1.6252 0.4227 C.1(75 C.4145 0.2133 C.1594 C.134E 0.1174 C-1005 ##TIPATE ERECE 24 ###CEPTICE CF ACTUAL FARLUSE 2878 3.72 5.65 113-29 55.63 24.62 17.50 7.86 (.50 0.0267 C-1444 0.1487 0.0866 C.C491 C.C374 0.0222 148.455 174.515 CLPCLATINE FATLURES 27-C2CC 3C-C4CC 33-1700 16.460C 25.42CC 42.3566 45.2400



CASF 15

#P#11	1	2	3	•	9	ŧ	7	4
ACTUAL PAILURE RATE	C.7CCG	0.3660	0.0503	(.5930	C.206C	C.1666	C.4CC0	ç.;ccc
#L###EC 1221 71FE	C-2322	0.5417	3.2564	(.3250	C.8126	1.665	C.46e?	C.\$417
4CCEL E:11+4*E	1.5230	0.9418	C.4566	C.5736	C.4183	0.7441	0.3610	5.42' 2
ESTIPATE FACTOR AS	117.57	223.24	713-18	14.72	105.13	146.15	2.25	46-41
SEPPLE STE CENTATION	1.0093	0.6302	C-83C5	C-4133	E.4C54	4.2845	0.4862	C.2511
CLPLLATINE TEST TIPE	1.074	3.273	18.481	15.990	12.722	31.225	32.112	1:.:7:
CLPLLETINE FAILURES	C.79CG	1.4856	2.1400	2.9300	1.6500	4.4260	1.05(6	5.6766

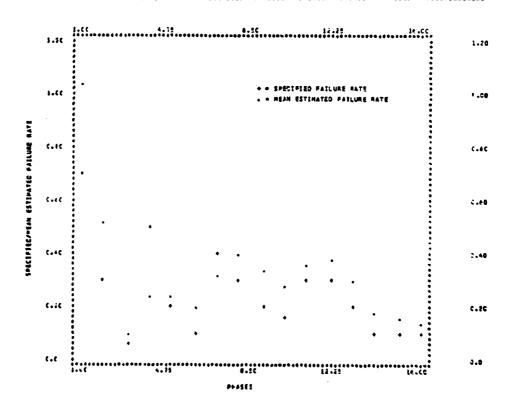
F+ # 2 E 10 11 12 14 16 STEAL PAILLET BATE 3535.3 0.1:00 0.1000 0.3000 (.3000 C.236C C.ICCC 0.1003 FLAPPEC 1857 TIME 0.8126 1.0625 C.5417 C.:417 C.6126 . 1.6252 1.6252 1.6252 PCCEL ESTIMATE 2.3174 0.2754 0.4455 C-4432 0.4311 C.2684 C.2146 C. lece 1Ce# . 76 83.72 47.76 115-55 148.26 114.63 46.63 ec.ec SEPPLE STC CENTATION 0.2110 C-2964 C.381C 0.2275 C-2007 C.1181 C.4455 CUPLLATIVE TEST TIPE 48.057 75.729 39.251 44.288 46.786 45.254 53,305 46.484 CUPULATINE FAILURES e-350C 7.4200 4.3100 \$.1000 1.8166 10.:160 11.3500



C/SI 15

	1	2	3	•	\$	4	7	•
ACTUAL FAILURE RATE	C.7CCC	0.3660	C.05G0	C.500G	£.2CCC	6-1CCC	C.4CCC	£.2000
PLAPREC 1851 TIPE	C.2111	0.5417	3.2964	C.3250	C.8136	1.6252	C.4(£3	0.:417
*CCEL E:11P41E	1.0252	C.5142	0.0557	C.249C	C-5347	9.1500	9.3264	C.4CL7
PATILIFE TATE ACTUAL	48.44	72.74	15.36	38.75	35.52	40.03	17.65	11.50
STATE THE CENTALICA	C-5288	0.3443	4.1558	(.3090	C.2020	6.1746	0.2563	0.29'2
CUPULATINE TEST TIPE	2-104	7.083	37.101	40-105	47.464	67.576	66.1Q4	11.742
CLPALATINE FAILLRES	1.7166	3.2409	4.0500	4.3000	7.5206	5.38CC	16.5650	12.9900

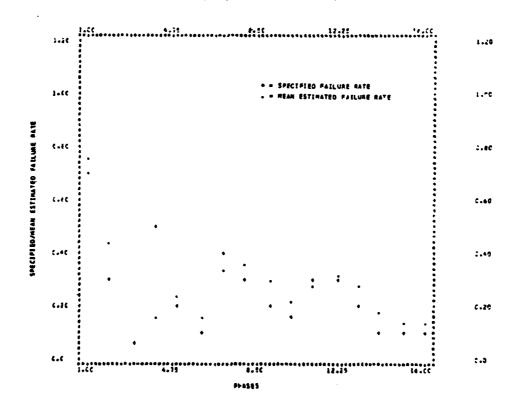
	•	10	11	12	13	14	19	16
ACTUAL PARLUFE BATE	C.2068	0.1988	0.3630	C.3300	2306.3	6.1565	0.1000	2.166
Self test line	C.8124	1.6635	C.5417	C.5417	C.ELPE		1.4252	1.6292
>CC86	0.2430	0.2760	C.3541	C.3716	6.2526	0.1863	C.1546	C. 1419
entrale entraction	71.57	44.03	16.61	23.45	46.61	fe.28	24.17	41.52
431 TAT / 23 OF 2 344 EE	C.3C57	0.2157	0.3624	C.2002	C.2414	C-C460	C.C7e2	C. Ce3 1
CLPLLATINE TEST TIPS	78.786	44.125	\$3.707	18.702	106.246	121-105	194.257	191.192
CLPLLITENE FITLLPES	12.0300	15.4003	17.1600	16.4820	3C.110C	21.42CC	23.2900	24.6700



CASE 15

4446	ı	2	3	•	5	•	7	•
ACTUAL PAILURE RA'S	6.7666	0.3000	C.0100	(.5000	6.2006	C.ICCE	8.4000	2325.2
FLIFATE TEST TIPE	0.2322	0.9417	3.2:64	(.3250	6.8154	1.4252	C.4Ce3	C.5417
PCC8L #1119418	C.1422	0.4386	0.2405	(.1631	(.2373	0.1014	C-2724	C.2647
######################################	4.45	*6.15	20.58	47.35	18.44	41.74	14.65	21-44
5446LE 57C CENTATION	C.42C\$	3.3152	0.0354	C.2237	C.1373	0.1654	C.345e	C. 1631
CL*LLATINE 1EST TIPE	4.272	14.268	74.544	10.098	19.634	124.533	132.346	142.27#
CLPLLITINE FRILLPE!	2.9466	5.8103	4.0000	11.7600	14.8866	10.0200	21.32CO	24.4 <u>9</u> CC

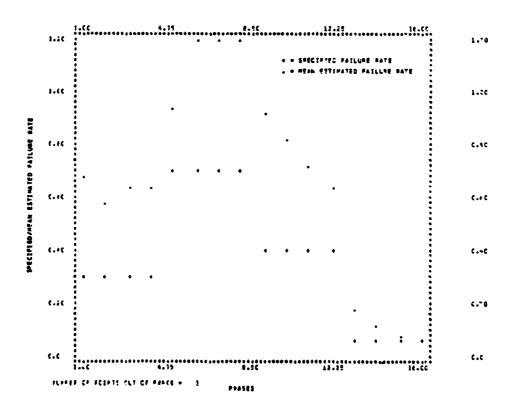
11 12 10 12 14 19 16 PCTUPE PAILURE PATE C.1CC0 0.1600 0.1000 C.2CCC C.15CC C.3CC0 (.3000 C.2CGC FLIPPEE TEST TIPE C.4:24 L.CESS 6.5417 C.5417 1.6252 1.6252 PCCEL ESTEMATE 1275.0 3.2764 0.2749 C.273C C.37:2 C-1454 C-1323 C.3298 47.95 47.05 8.37 9.93 14.52 72.21 45.38 12.2¢ C-1474 3.1687 0.1547 1705.3 C.1417 0.0743 0.0584 3.6471 CUPULATINE TEST TIPE 157.242 177.242 187.247 157.194 212.154 242.173 272.258 302.304 CUPLLATIVE PAILURES 27.4000 30.4200 33.410C 14.6400 34.e10C 42.4466 45.4500 48.4300



CASE 10 5 ITEPS

****	1	2	3	•	5	ŧ	7	
16161 FATLLEE *A*E	C.3CGC	0.3000	C.3CCC	C.3000	6.1000	6.7000	0.1000	e.1666
FL8PPEC 1881 7198	0.54L7	0.5417	0.5417	6.5417	C-3322	0.2322	C.2222	0.2322
PCCEL ESTIPATE	C.4656	0.5755	0.4474	6.4345	C.5375	1.2271	1.2638	1.2372
##17-416 ###C# 44 ##############################	140.55	\$1.56	115.45	112.43	12.61	76.73	71.02	76.76
SEPPLE STC CEPTATION	C-3424	C.3Ce#	C.3514	(.3528	C-4532	0.6400	3.8665	0.8507
CLPLLATINE TEST TIPE	2-104	5.642	7.507	17.020	11.115	12.150	13.223	14.788
CLPLLATIVE FAILUPES	C.71CC	1.3300	2.1400	2.83GC	2.4000	4.2500	5.1006	4.6736

*** !! 10 . 5 13 16 ACTUAL FAILURE FATE C.4300 6.6366 6.6966 c.0:co c.c.c: C.4CGC 0.400 C-+CC3 3.2504 #LANEC 1881 TIPE 2.2:04 C-4C43 0.4663 0.4643 C.4C63 2.2504 3.2964 PCCEL #511947E 0.7253 C-4333 C.1755 0.0762 C. Ce72 William Track 34.40 130.54 102.60 41.33 \$8.33 255.CE 184.64 \$e.41 SAPPLE STC CENTATION 0.5279 0.5254 C.374C C.C858 0.0451 C.C??4 C-C*55 C.8110 CLOLLATINE TEST TIPE 14.745 14.146 18.617 11.004 11-4.00 CLPELITINE PATIENTS e.7ECC 7.5360 6.27CG £.5760 1.6100 16.4666 11.2669

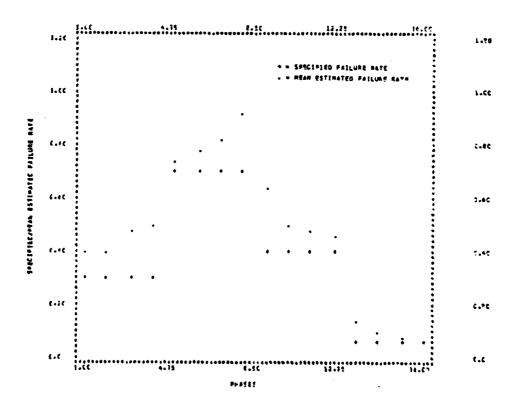


CASE 16 16 STEPS

*****	ı	i	,	•	5	•	3	•
467646 #2566#E #A1#	C.3CGE	7.3000	c.3ca0	C.3000	£.100C	C.7CC0	0.1000	C-1000
FLAPREC TEST TIPE	0.5417	0.5417	9.5417	C.5417	6.7227	C.7:12	C.2372	C. 2222
*CCEL #571>476	C.4Cf1	2.3541	0.4855	C.4951	C-1465	6.1763	0.6273	6.5147
Principal de la contraction de	36.28	31.27	43.17	45.02	4.76	16.64	17.47	30.41
SAPPLE STE CEVIATION	C.515C	0.2343	0.3764	(.253)	C.5528	0.4665	0.4535	0.5040
CLALLATINE TEST TIME	4.527	9.132	14.858	19.747	21.905	24,061	26.213	28.341
CLPLLATINE FAILURES	1.5566	2.5700	4.7360	4.5406	7.4766	9.1400	10.5400	12.4700

.

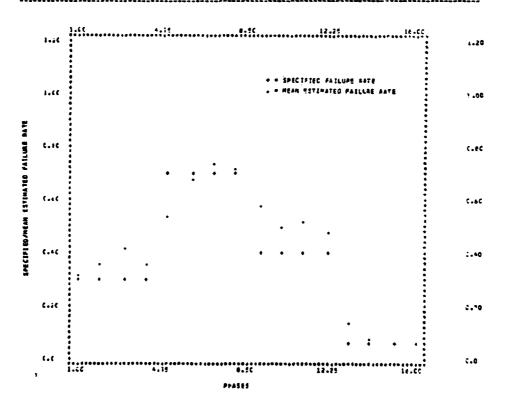
FF456	\$	10	11	12	113	14	19	16
ACTUAL PAILUFE PATE	C.4CGG	J.4CCG	C.+CGC	C.4000	3363.3	6.0:00	0.0100	0.0500
9149916 1857 TIPE	C.4C63	7.4Ct3	0.4663	C.4C63	1.2504	3.2:04	3.25(4	3.2504
PCCEL 8515947E	0.6387	2.4563	3.4621	C.4680	C-147C	C.[549	0.67:5	C-(414
RETTO ATE BEACE ACTUEL	55.47	24.62	\$6.53	14.55	154.CE	62.63	21.62	23.15
SAPPLE STC CENSATION	0.3417	3.2653	0.2144	C.1534	C.C787	0.6423	G.C565	G.CZ7e
CLOCKATINE TEST TIPE	32.129	35.450	35,105	43.459	77.410	162.716	121.155	147.586
CLPLLATINE FACILIZES	13.4:00	19.0400	16.5200	14.0760	35.4800	30.8400	12.3300	33.8500



CASE 18

99458	1	1	3	•	5	4	1	•
ACTUAL PAILURE MATE	C.3CCC	0.3669	C.3000	C.300G	(.1000	6. ;cc6	C. 76((C.7CCC
#LAPASC 1E:1 T:>E	9.5417	0.9417	C.5417	6.5417	C-2322	6.5325	C-2322	Ġ.222
*CGEL #37:#47#	C.3215	2.3610	C-4102	C-3591	C-5374	0.4749	0.7301	0.7270
Principle of Contin	7.16	20.94	36.75	19.71	12.21	1.62	4.36	3.66
SIPPLE STE CENTATION	0.1415	0.2141	0.3276	C.1576	C-2054	0.2245	C.4018	C. 2486
CUPALITY TEST TIPE	9.556	19.586	29.890	29.508	44.266	48.472	\$2.144	57.035
CLPLLATINE FAILLARE	3.3366	5.5000	4.1 eG0	12.0400	14.6166	19.1266	21.0200	23.4500

FASS	•	10	11	12	- 13	14	1.5	16
467646 FEILLPE MATE	C.4666	0.4665	C.4900	C-400G	(.0506	8.2166	0.0:00	C.C:CC
9427 1291 314AAJA	C.+(43	0.4082	G.4(43	C.4G03	1.2964		2.7504	3.2504
PCCEL ESTINATE	0.5738	0.3611	0.5129	C.474E	C.1214	8.6874	C.(647	C.C587
ESTINATE ESTEN ASTURL FAILURE FAILURE FAIL	43,46	25.28	20.22	14.70	174.66	14.82	36.64	17.42
SAPPLE STC CEVENTICA	C.271C	0.2215	0.2364	C-1413	C.C597	6.0340	0.0251	0.0166
CUPULATINE TEST TIPE	64.565	72.651	75.547	£7.097	147.563	204.236	267.726	327.623
CLPLLATIVE FAILLESS	24.510C	29.8603	33.1100	36-0300	36.5000	41.5460	44 .e 2CC	47.5566



LIST OF REFERENCES

- 1. Military Handbook for Reliability Growth Management, Proposed MIL-HDBK-XXX, 7 July 1978.
- 2. Crow, L. H., 1975, "On Tracking Reliability Growth", Proceedings 1975 Annual Reliability and Maintainability Symposium.

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